



# IT Labs Annual Report

2011-2012





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# A Message from the CTO-IT



***Dr. Sasi K. Pillay, Agency CTO-IT***

IT Labs is a mechanism by which an opportunity is created to be innovative in the IT arena. One important aspect that is near and close to my heart is that no one person has an exclusive license to come up with ideas on new ways of doing business; it involves the entire community and organization.

Ideas and collaborative opportunities can come from anywhere, and often times in unlikely places.

There are two important factors to understand about IT Labs. The first is to identify ideas across the board and bring them to production and work with the latest and greatest tools and technology to properly realize these ideas. The second is to drive home the concepts of collaboration and synergy.

We are so focused on delivery times and customer satisfaction—which is important—but we do not seem to take the time to step back and look over what is appropriate for performing our job functions more efficiently, now and in the future. IT Labs takes this time and provides appropriate funding to ideas and initiatives that strive towards this goal.

## ***On the Future of IT Labs***

I am hoping that this program will continue to grow, and become the first collaboration and IT collection point for users at NASA to go for all aspects of IT—mission-related IT, evaluation of IT technologies and sharing of IT ideas.

Even before starting a program of their own, Agency users can look to the IT Labs website to see if ideas have already been realized or could be improved upon. In addition, the site could include information pertaining to independent IT endeavors—communicating discoveries and findings, adding further value to the IT community.

When people within the NASA community think “IT”, I want them to think IT Labs.

And much like our solicitation for ideas for projects across the Agency, our innovative nature naturally leaves us open to ideas on how we can improve our program. Ultimately, our program’s goal is to benefit NASA, and any input from Agency users in efforts towards that goal are always welcome.



# Introduction

This report tells the story of IT Labs by showcasing innovative projects funded by the program. Each project—whether a huge success, a work in progress or a lesson learned—is granted a voice through the words of its creators and contributors.

Embedded within each project's narrative are seeds of knowledge that have taken root within IT Labs, growing the value of the program by realizing innovative, NASA-relevant ideas. The successes, innovations, and even failures experienced in each project, are essential to increasing the program's value and are in line with its true purpose: to facilitate the development of ideas, proofs-of-concept, prototypes and pilots that have the potential to help NASA reach its strategic goals, while also meeting its evolving business needs.

At NASA, teamwork is essential—and challenging. The most astonishing successes derive from the blending of work that is performed by people from varying backgrounds and circumstances, who are dispersed around the globe. IT Labs synthesizes the efforts of a diverse and distributed workforce. This report is meant to demonstrate not only the value of each project, but how they contribute to the value of the program, as a whole.

## ***Report Organization***

This report includes: an introduction to IT Labs, CTO-IT commentary on the program, detailed descriptions of recent projects, brief synopses of upcoming projects and information pertaining to future development of the program.

The first section describes the program's inception, its role in NASA's innovation framework and its evolution as a valued program. This is followed by recent press coverage and the observations of NASA CTO-ITs regarding IT Labs' value.

Descriptions of recent projects are detailed accounts, written from the perspective of the project lead, who communicates the project's story—including its purpose and value—on a personal level.

Synopses of upcoming projects describe newly funded projects and their goals.

Information pertaining to the future development of the program concludes the report with a road map to future plans and collaborative opportunities.

# IT Labs: Reinventing the Way NASA Does IT

The NASA Chief Information Officer's portfolio includes a wide range of infrastructure support services. Some of these solutions are outdated and expensive to maintain, but budget restrictions limit NASA's ability to make the necessary updates to these essential capabilities. In order to evaluate alternative solutions for existing business needs, NASA requires the ability to evaluate, adopt and adapt emerging information technologies—quickly and cheaply. A lightweight innovation framework will also help NASA keep pace with the accelerating dynamics of technological advances and maintain its status as a global technology leader.

The IT Labs program was established under the Office of the Chief Technology Officer for Information Technology (CTO-IT) in May 2011. Its purpose is to provide a streamlined approach for evaluating new information technologies and processes for Agency integration in support of the Office of the Chief Information Officer (OCIO) and the Information Resources Management Strategic Plan.

The **Vision**: Engage the brightest minds across the Agency to guide NASA's IT strategy and investment decisions, and identify IT capabilities that can best support NASA's needs in a rapidly changing world.

The **Mission**: Adapt to keep the pace of constantly evolving technology by leveraging a lightweight and efficient process to explore innovative ideas.

IT Labs represents a significant leap from how NASA traditionally evaluates new technologies. To reduce risk, large scale IT projects at NASA are governed by directives, which require multiple layers of documentation, evaluation and approvals. As a result, employees with access to funding at sub-Enterprise levels face a powerful temptation to conduct quick, low-cost evaluations of innovative technology on their own—a temptation to which they often give in. This results in duplicative efforts and spending, even as NASA struggles to maintain essential services with a decreasing IT budget.

IT Labs was created to help make strategic investments in innovation. It is an innovation incubator, soliciting ideas from the greater NASA community and enabling their development as part of a rapid, low-cost, low-risk process.

The program provides a central collection point for innovative ideas, as well as a lightweight, low-cost methodology for research, proofs-of-concept and

prototypes. The IT Labs process for project evaluation allows for projects to be quickly and effectively evaluated based on essential criteria identified by the program, at defined points in the project's life cycle. This evaluation of quality and potential viability mitigates risk factors of both time and cost, effectively providing a better chance for more projects to be realized.

IT Labs shares project results with all of NASA, enabling others to apply lessons learned to their own projects or collaborate on new efforts inspired by project results. In addition, IT Labs works diligently to build partnerships within the Agency—Mission Directorates, Centers and facilities—to pool resources in the pursuit of meaningful, cutting-edge technology solutions that can better meet NASA's needs.

The program strives to keep the amount of paperwork and oversight to the necessary minimum, removing institutional inhibitors to innovation and enabling the speedy evaluation of technologies that can help government agencies meet both their Enterprise requirements and their strategic goals.

## Evolution

During the past year, IT Labs has tailored elements of the program to better meet the OCIO's requirements for a collaborative innovation framework. It has established and leveraged partnerships, established a platform for communication and collaboration and developed processes to facilitate the innovation-to-operation goals.

## Personnel

With the primary focus on innovative projects, IT Labs consists of a small, integrated team with low administrative overhead; this provides the program with better opportunities in funding more projects.

## Website

IT Labs launched its internal website (<http://labs.nasa.gov>) in May 2012. The website enables project leads to communicate project statuses and provides an Agency-wide collaboration forum for IT innovations.

For a more in-depth description of the website and its progression, refer to the *IT Labs Website* project in the *Recent Projects* section of this report.

## Partnerships and Collaboration

As the great Michelangelo once said, “I am still learning.” IT Labs continues to grow and learn as we develop new projects, processes and relationships. We believe the best way to learn is through sharing and gathering insights from a diverse collaboration network.

The cornerstone of IT Labs’ success is its cross-functional and cross-Center collaboration. By branching out and creating a network of IT innovators, IT Labs is able to identify otherwise stovepiped advancements and initiatives and connect them with like-efforts across the Agency. In doing this, the program is able to reduce duplication of effort and identify shared requirements for processes, systems or applications that can be expanded to fit Enterprise needs.

In addition, IT Labs proudly partners with other Federal Agencies and continues to cultivate those relationships in support of the NASA mission. This year we have worked with several other Agencies to benchmark and share successes, such as the General Services Administration (GSA), Environmental Protection Agency (EPA), National Oceanic and Atmospheric Administration (NOAA) and U.S. Agency for International Development (USAID).

Along with Federal Agencies, the program has also collaborated with industry partners such as Google, Microsoft, Verizon, Apple and Wolfram Alpha—just to name a few. IT Labs values the insight of its industry partners and works with them to learn about new and cutting edge technology.

IT Labs also values partnerships in academia, and has engaged in a formal sponsorship with the MIT Center for Information Systems Research (CISR). As part of this sponsorship, IT Labs had the opportunity to submit a project proposal for MIT Graduate student research in Spring 2012. The proposal to evaluate the IT Labs program and processes for business efficiency and effectiveness was accepted and research and recommendations from the analysis are currently being incorporated.

## Process

IT Labs has had a lightweight process in place for projects funded by the program.

The team has built on its experience with the first round of funded projects and crafted a process that maintains a lightweight approach, but also keeps project leads accountable for milestone deliverables with pre-defined points of review and templates. These templates include documents such as position papers, white papers and business cases—each including a standardized format and commentary that defines what information is required for the project to be evaluated.

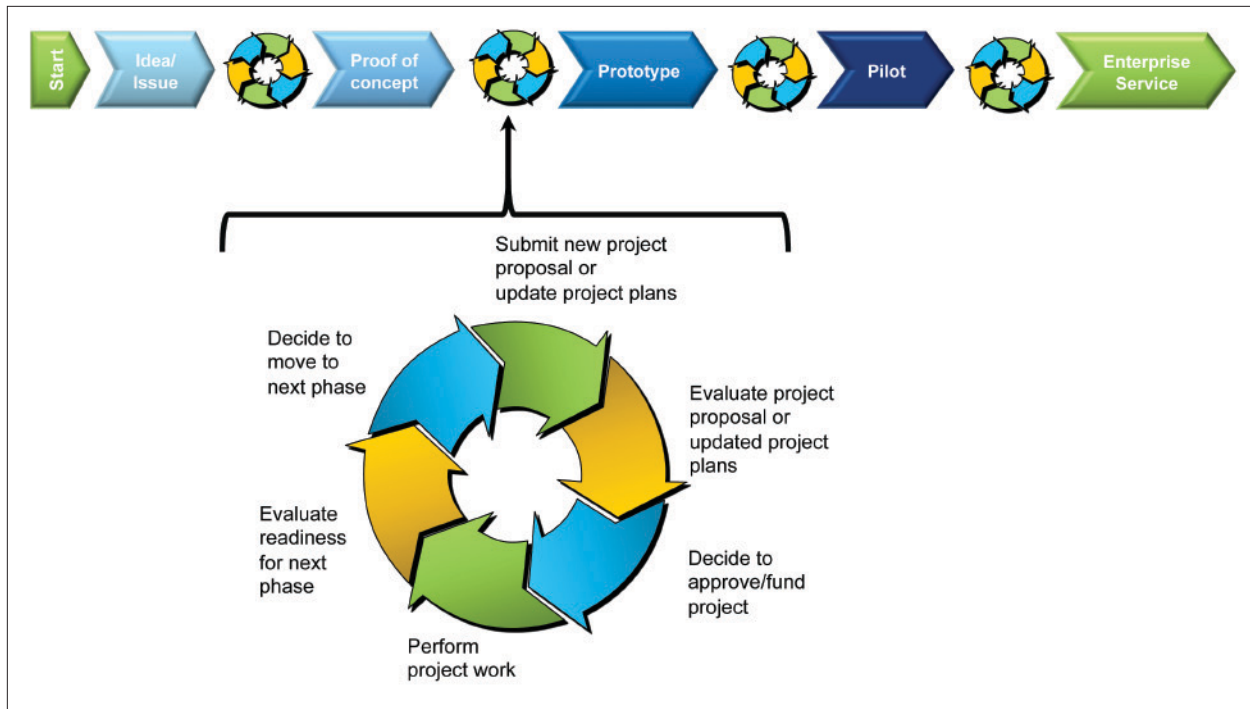
IT Labs has identified four phases that a project will progress through to eventually become an Enterprise service. Successive phases build on the deliverables generated in previous phases to ensure efficient utilization of resources.

The four identified and defined phases are as follows:

- Idea/Issue – Identify an Agency need and evaluate processes or technologies that can accommodate that need
- Proof-of-Concept – An agreement to quickly show whether a thesis for using the targeted capability or technology would work in the proposed environment
- Prototype – An agreed-upon limited-scope trial aimed at solving a specific business problem that is representative of the eventual larger solution
- Pilot – A small-scale implementation of the solution that includes a representative subset of customers and other impacted stakeholders

In addition to the four project phases, IT Labs has also defined processes for projects to move from one phase to the next. Refer to the following process diagrams for a visual flow of the process.

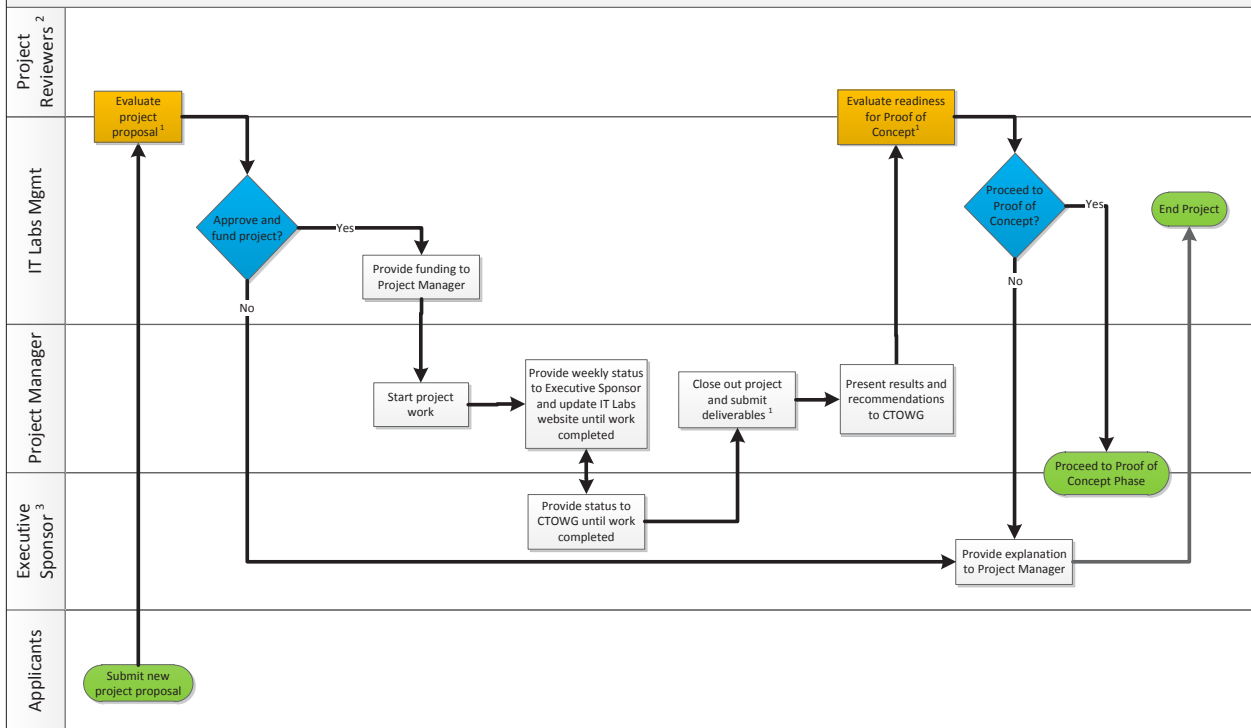
## IT Labs: Reinventing the Way NASA Does IT ...continued



Overall Process Diagram for an IT Labs Project Progressing to an Enterprise Service



# IT Labs Processes – Idea/Issue Phase



<sup>1</sup> Further detail available in process documentation

<sup>2</sup> Project Reviewers include CTOWG members and solicited representatives from the OCIO

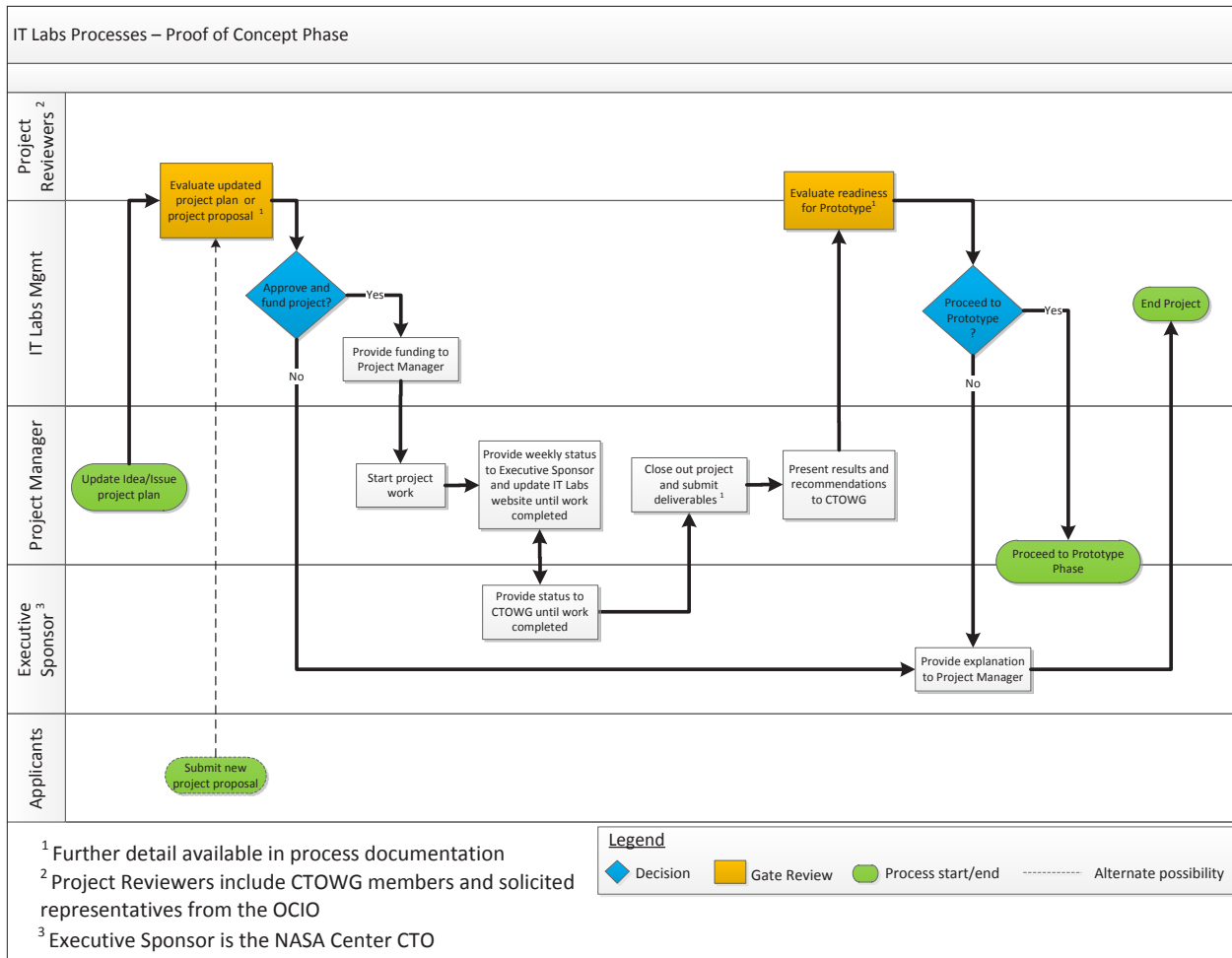
<sup>3</sup> Executive Sponsor is the NASA Center CTO

## Legend

◆ Decision    ■ Review    ● Process start/end

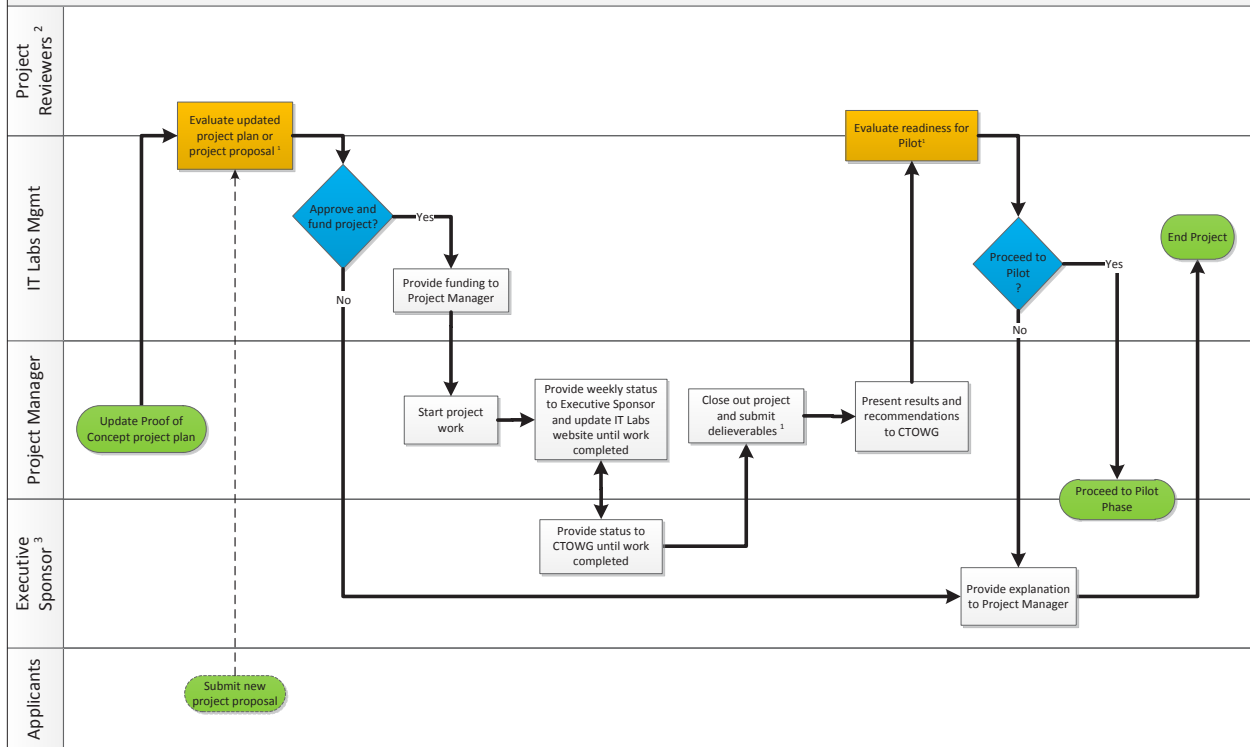
*Progression from an Idea/Issue to a Proof-of-Concept*

## IT Labs: Reinventing the Way NASA Does IT ...continued



*Progression from a Proof-of-Concept to a Prototype*

# IT Labs Processes – Prototype Phase

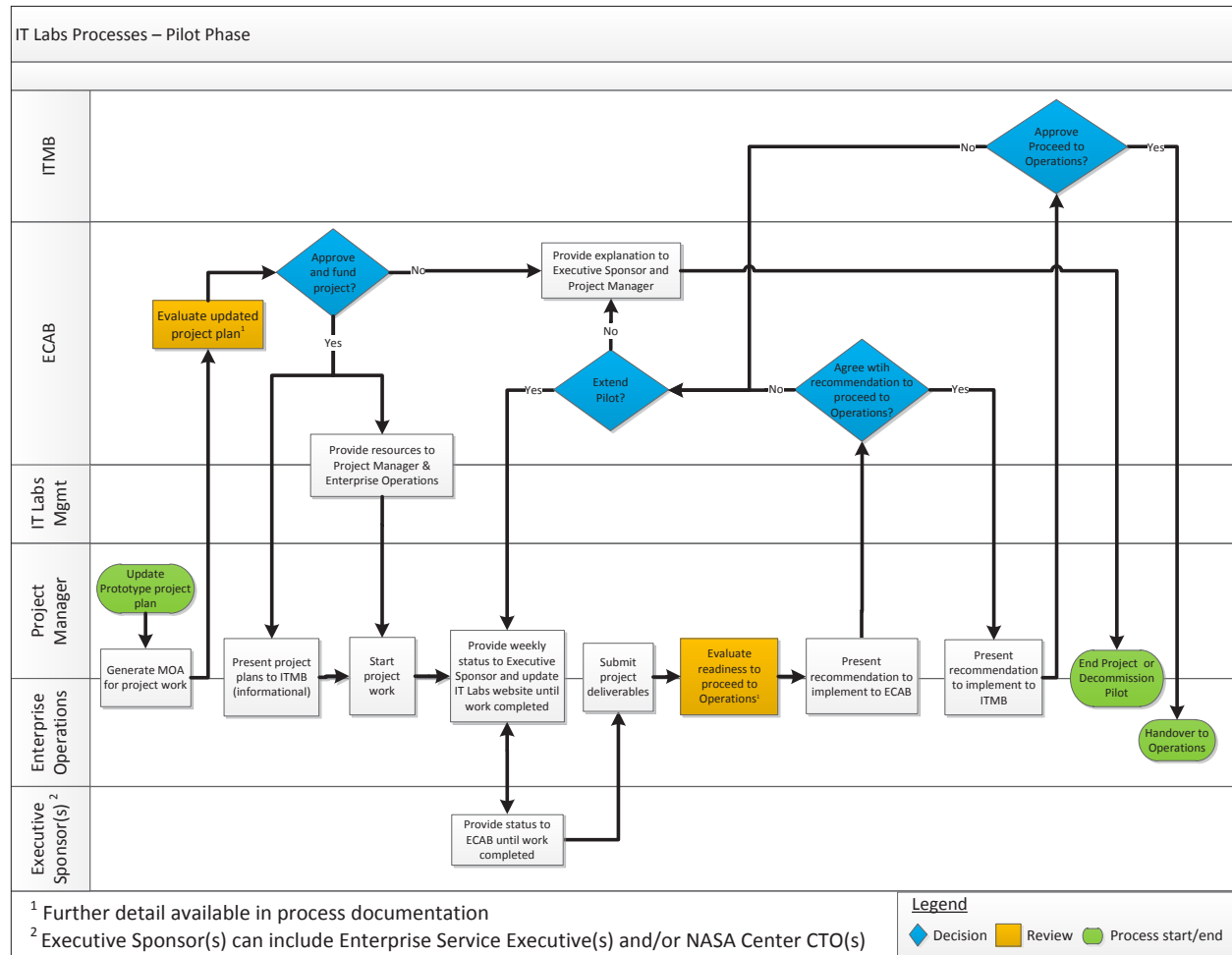


<sup>1</sup> Further detail available in process documentation  
<sup>2</sup> Project Reviewers include CTOWG members and solicited representatives from the OCIO  
<sup>3</sup> Executive Sponsor is the NASA Center CTO

**Legend**  
◆ Decision
■ Gate Review
● Process start/end
----- Alternate possibility

Progression from a Prototype to a Pilot

## IT Labs: Reinventing the Way NASA Does IT ...continued



*Progression from a Pilot to an Enterprise Service*



# Press

As a demonstration of the proven value that IT Labs holds, detailed below is published material pertaining to the program across various web media outlets.

## NASA

*NASA's Federal Personal Identity Verification (PIV) Credential Teams Up with Google Apps*

— **IT Talk** (Volume 2, Issue 1; January – March 2012)

Link: [http://www.nasa.gov/pdf/614470main\\_ITTalk\\_JAN2012.pdf](http://www.nasa.gov/pdf/614470main_ITTalk_JAN2012.pdf)

This article names IT Labs as the sponsor for the Google Apps pilot to “meet the growing demand from workers to access resources anywhere on any device.” Mobility in a changing technological environment is key, and IT Labs foresaw the intrinsic value in funding a project intended to capitalize on that.

*On the Lookout: JSC's Search Enhancement Team*

— **IT Talk** (Volume 2, Issue 2; April – June 2012)

Link: [http://www.nasa.gov/pdf/635602main\\_ITTalk\\_APR2012.pdf](http://www.nasa.gov/pdf/635602main_ITTalk_APR2012.pdf)

IT Labs is featured in this article for its work with the JSC Information Resource Directorate's Search Enhancement Team on a pilot called “Collaboration Search Portal”. This pilot will test a federated search capability for the Agency, in hopes that “the collaboration search portal will reach all collaborated related content within the Agency and one day make all types of content available at your fingertips.”

IT Labs, as the innovation incubator, looks for revolutionary projects such as this one (described in detail later in the report) to fund, thereby helping NASA evolve in the technology arena.

## RedOrbit

*NASA Tests New Smart Card Access To Google Apps*

— **RedOrbit**, Space (December 12, 2011)

Link: <http://www.redorbit.com/news/space/1112437951/nasa-tests-new-smart-card-access-to-google-apps/>

This article featured on RedOrbit's website was posted prior to the article featured in IT Talk, described above.

## NASAhackspace

*NASA ARC Internal Memo: NASA IT Labs First Annual Project Call*

— **NASAHackSpace**, Crowdsourcing (May 16, 2012)

Link: <http://nasahackspace.com/2012/05/nasa-arc-internal-memo-nasa-it-labs-first-annual-project-call.html#more>

IT Labs announces its project call and provides some information on the program in this article.

## GovLoop

*Failure is an Option*

— **GovLoop**, NextGen Lightning Speakers (May 29, 2012)

Link: <http://www.govloop.com/profiles/blogs/allison-wolff-failure-is-an-option>

From the GovLoop blog: “Over 80 people submitted their stories to share at the Next Generation of Government Training Summit taking place...in Washington DC. Most of these story submissions are based on innovative projects being worked on in government or ideas that have and are revolutionizing government.”

Each story submission was judged by members of the NextGen board, and the submission titled “Failure is an Option”, submitted by Allison Wolff—program manager of IT Labs—was selected as one of the twelve, highest-scored finalists. And although the submission did not go on to be one of the final three chosen for speaking at the summit, to be nominated out of such a high volume of submissions showed the value of the words in regards to the program.

The submission places a positive spin on failure, noting that it is “an important part of the experimental process” but in turn, poses the question “...how do you fail efficiently?” It then goes on to introduce IT Labs and its “new, streamlined process” which focuses on “reducing pitfalls, encouraging lessons learned in every phase and providing project managers with the tools to nurture ideas into potential technologies that all Agency users can benefit from.”

# A Message from the Program Manager



**Allison Wolff,**  
*IT Labs Program Manager*

NASA has worked hard to develop rigorous, iron-clad processes for developing everything from collaboration to mission control systems. While gate reviews and stringent examination is imperative—

particularly when lives are on the line—this process-heavy approach leaves little room for the smaller “what if?” initiatives. To add to the challenge, how do we fund these potential “failures” while remaining accountable to our shareholders (e.g., the American taxpayer)?

IT Labs was created to help encourage investment in innovation while maintaining a lightweight, efficient process for the integration of new information technologies. By keeping the investments small, and the process streamlined, this small but effective program has already made great impact across the Agency by reducing pitfalls, encouraging lessons learned in every phase and providing project leads with the tools to nurture ideas into potential technologies that all Agency users can benefit from. What we have learned, and continue to learn, can help prevent future failures and create a path to success.

This inaugural year of the IT Labs program has been both challenging and rewarding, but the foundation we have laid has set a precedence for future IT innovation processes, and I look forward to exploring many new opportunities in the year to come.

# The Value of IT Labs



**James B. McClellan,**  
*JSC CTO-IT*

IT Labs allows people an avenue to explore ideas outside of what our normal project work restricts them to and to dig outside of our silos.

One of the biggest problems at NASA is our inherent proclivity

to silo. That, in combination with the focus naturally associated with accomplishing the assigned task, creates an environment where frequently any idea that does not directly progress the specific problem at hand will result in the idea being ignored or even dissuaded.

The CTO community owns the Technology Infusion portfolio, so we are actively looking for all the great ideas we can get our hands on to better enable innovation within our workforce and bring forward ideas we know exist, but have a difficult time getting traction in the traditional system.

There are several groups throughout NASA looking at and actively working on innovation projects. IT Labs is establishing itself as one of the leaders by providing a mechanism and systemic process to capture that latent talent and give it an opportunity to develop an idea related to information technology into something that delivers real value to NASA.

From its humble beginnings to the very organized and focused approach we enjoy today, IT Labs has stepped up to the plate and is starting to hit some great ideas and projects out of the park.



**Ben Bryant,** *KSC CTO-IT*

I believe that the value that IT Labs holds is that it has opened up an opportunity for the exploration of innovative ideas across the Agency that otherwise would not exist.

IT Labs allows the quick examination—with little overhead—

of innovations with the prize being the information that is discovered. The program allows collaboration across the Agency of ideas and provides a mechanism to easily share results and receive feedback. Another benefit of IT Labs is it becomes part of the process in helping to bring an idea into an operational reality, allowing smaller steps of discovery instead of jumping all in with a higher risk of failure.

The first year of IT Labs has been a successful pathfinder and I see it only getting better because of the IT Labs team's willingness to continue working to improve the experience.



**Edward McLarney,** *LaRC CTO-IT*

The value of IT Labs is that it is a breeding ground for innovation. Small monetary investments give organizations across NASA the small boost they need to fund cutting edge projects. Then the idea that learning/products is/are shared across NASA

helps bring us together, share more and link innovators.

IT Labs is helping foster a creative innovation environment across NASA by encouraging & funding small innovation projects, and then sharing the results Agency-wide. The appropriately lightweight and agile IT Labs process also builds robust dialog among IT professionals and enduser participants—who team to innovate with relatively small investment. The OCIO/user team building alone is worth the investment; the actual shared IT Labs products multiply that investment many times over.

Also, dividing the innovation labor among Centers helps us avoid unnecessary, redundant work. IT Labs allows the agency as a whole to be more efficient in IT innovation.

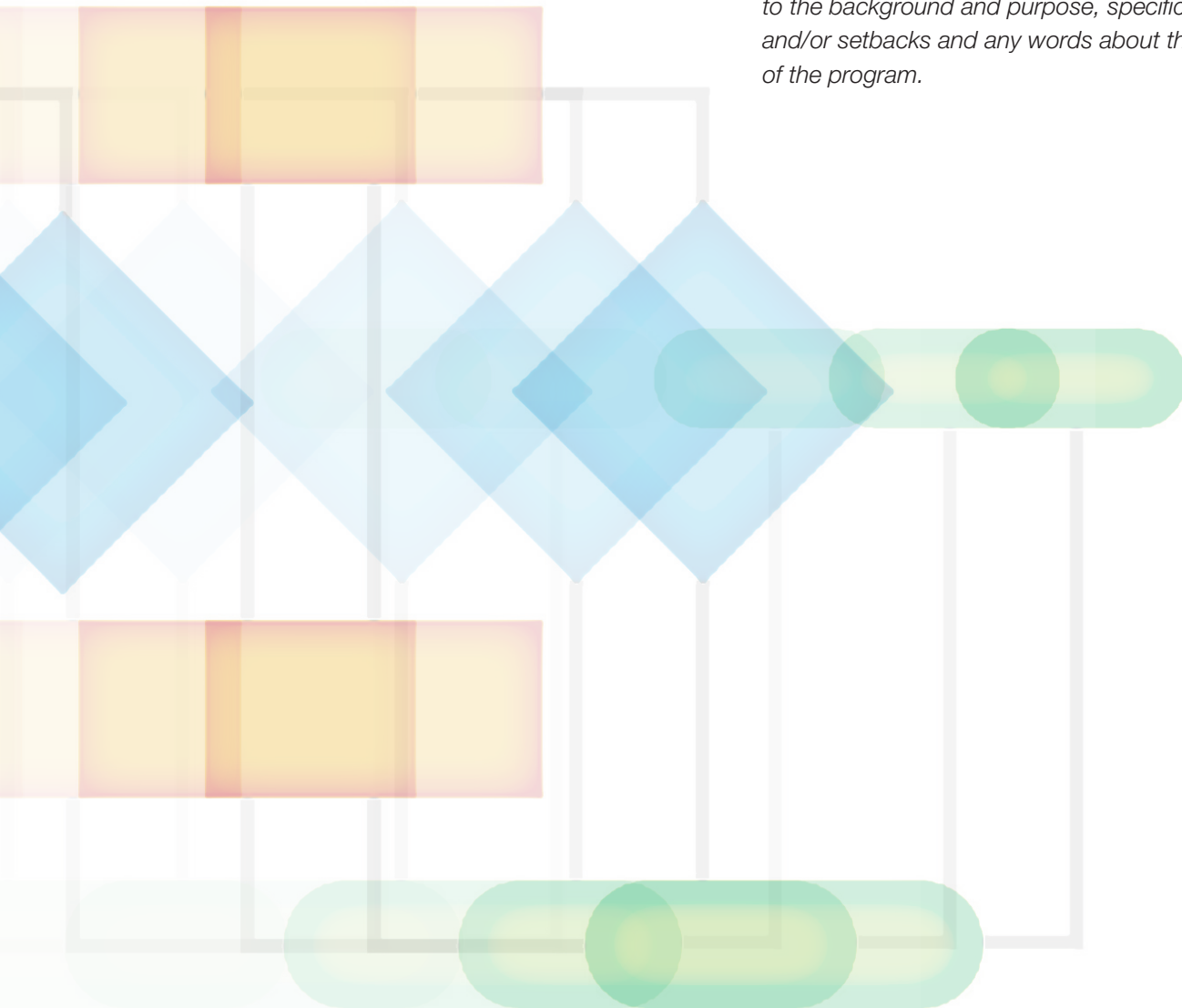




## Recent Projects

*Detailed in the following pages are projects funded by IT Labs in the previous project cycle. Each project is written from the project lead's point of view and allows them to narrate the story of their realized idea.*

*Included in their narrative is information pertaining to the background and purpose, specific successes and/or setbacks and any words about the value of the program.*



# Agency SharePoint: myNASA



Project Lead: Faris Mondey  
Project Sponsor: Allison Wolff  
Additional Contributor(s): N/A  
Base Center(s): JSC

*"IT Labs is the right thing for NASA...a 'think tank' of IT innovation, without which, IT solutions might never have the opportunity to succeed."*

Faris Mondey, Project Lead

The goal for my project was to study the possibility of centralizing information into a set of pages configured and personalized for the NASA employee, realizing that consolidation of information stovepipes is less realistic than presenting the look of consolidation through centralization. In other words: we needed to conduct a feasibility assessment for a collaborative information portal utilizing SharePoint 2010 and the MySites Capability.

This was slated to be an Agency-wide effort, with piloting to begin with small groups and centralization of information across large information repositories. Already in existence at JSC is myJSC—a consolidated collaboration environment that offers a personalized online dashboard for employees at the JSC Center. My project was an expansion of this environment and was intended to bring together similar and disparate information repositories to create a personalized, centralized and Agency-wide web portal (myNASA) supporting the information employees need to access quickly, share collaboratively and navigate electronically.

The screenshot shows the 'myJSC' SharePoint interface. At the top is a navigation bar with links: My Site, My Newsfeed, My Content, My Profile, myJSC Training, myJSC Help, and a search box. The user's name 'Mondey, Faris (JSC-IS111)' is displayed in the top right. Below the navigation bar, the profile page for Faris Mondey is shown. It includes a profile picture, a title 'Mondey, Faris (JSC-IS111)', and a bio: 'IT SPECIALIST JSC:IS111'. Contact information includes the phone number '281.483.3495', the address '45:306 Houston', and the email 'faris.mondey-1@nasa.gov'. There are links for 'Edit My Profile' and 'More information'. Below the profile information, there are tabs for 'Lists', 'Overview', 'Content', 'Tags and Notes', 'Colleagues', and 'Memberships'. The 'Overview' tab is selected. Under 'Overview', there is a section 'Ask Me About' with a list of topics: 'Information Resou...', 'IRD SharePoint Se...', and 'Database Architect'. There is also a section 'Recent Activities' which states 'Mondey, Faris (JSC-IS111) has no recent activities at this time.' On the right side of the profile, there is a section 'In Common with You' which lists common items: 'First manager you both share', 'Colleagues you both know', and 'Memberships you both share'.

Home Page of myJSC

In addition to the virtual consolidation of information, we also wanted the portal to enrich professional networking experiences by providing expert locator functionality, establishing communities of practice and providing an interface with the various professional networking tools such as Communicator, Yammer and LinkedIn.



*Alltop Page for myJSC*

It is essential to have the right information, at the right time, to make the best decisions. To ensure that this is the case, information architecture is a necessity for this Agency, and the consolidation and centralization of information and application stovepipes are the cornerstones of reducing our IT footprint—both physically and financially.

Though I would have liked a few more months to prototype the activity to demonstrate the value of the product, the time and needed funding was simply not there; however, we were at least able to deliver what we originally stated, which was the feasibility study—step one on the path to innovating collaboration and centralized information access.

myJSC

My Site My Newsfeed My Content My Profile myJSC Training myJSC Help Search

Mondey, Faris (JSC-IS111)

Calendar Tools

Events Calendar

Mondey, Faris (JSC-IS111) Outlook Calendar Calendar

This Calendar List will be used to track events and my outlook snapshot.

Search this site...

2012

July, 2012

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 12:00 am Bi-Monthly 9:30 am jSPUG 10:00 am FW: ITAM 3 more items	3 9:00 am CANCELED 9:30 am SASHA Me 10:00 am FW: JETS 2 more items	4 9:30 am SharePoint 1:00 pm IS TMR Ta 2:00 pm SharePoint	5 9:00 am - 11:00 am ICB	6 1:00 pm - 2:00 pm Engineering and In	7
8	9 10:00 am Pre-Pre I 3:00 pm IS Staff M	10 9:30 am SASHA Me 10:00 am FW: JETS 5 more items	11 9:30 am - 10:30 am SharePoint Operati	12 9:00 am - 11:00 am ICB	13 9:00 am IS Project 10:00 am SharePoi 1 more item	14
15 Palmer Lake Trip	16 10:00 am Pre-Pre I 1:30 pm CAR, Metri 3:00 pm IS Staff M	17 12 Steps to Useful 9:00 am ACB meeti 9:30 am SASHA Me 4 more items	18 Software Metrics (Holiday Inn Express - 1:00 pm IS TMR Ta 2:00 pm SharePoint 2 more items	19 9:00 am ICB 3:00 pm SharePoint	20 8:30 am JSC Caree 9:00 am IS Project 1:00 pm Engineerin	21

Calendars in View

- Outlook Calendar
- My Outlook Calendar

Lists

- To-Do List
- Outlook Calendar

Sites

Add

Calendar Page for myJSC

In an effort to display plans of future value determined from my project's success, the following describes the four future intended phases for myNASA as detailed in the feasibility study: phase 1 is a continuation of the feasibility study already delivered and establishes a detailed implementation plan for the full rollout of myNASA capabilities; phase 2 is the myNASA implementation phase that executes the configuration of the SharePoint 2010 environments at JSC to provide Enterprise services for all of NASA; phase 3 is Federation with other NASA Centers following stabilization of the JSCcentric implementation of myNASA and the technical managers' review of performance analysis data and storage trends; phase 4 addresses the varied integration and improvement needs required to execute the entirety of the myNASA vision, integration with mission information systems, Federating with public and Internet Web2.0 applications and providing the Agency with a platform for innovation.

Future integration with existing agency pilots of Google Search Appliance is targeted as an optional improvement in phase 4 and opens up the integration to a broader base of information systems. SharePoint 2010's own indexing engine can also be considered as an option to search and index all Agency content, instead of additional tools like Google Search Appliance; however, a consideration of FAST Search licensing and index storage will be critical to that option.



# Application Whitelisting



Project Lead: Andre' Allen  
Project Sponsor: James McClellan  
Additional Contributor(s): N/A  
Base Center(s): JSC

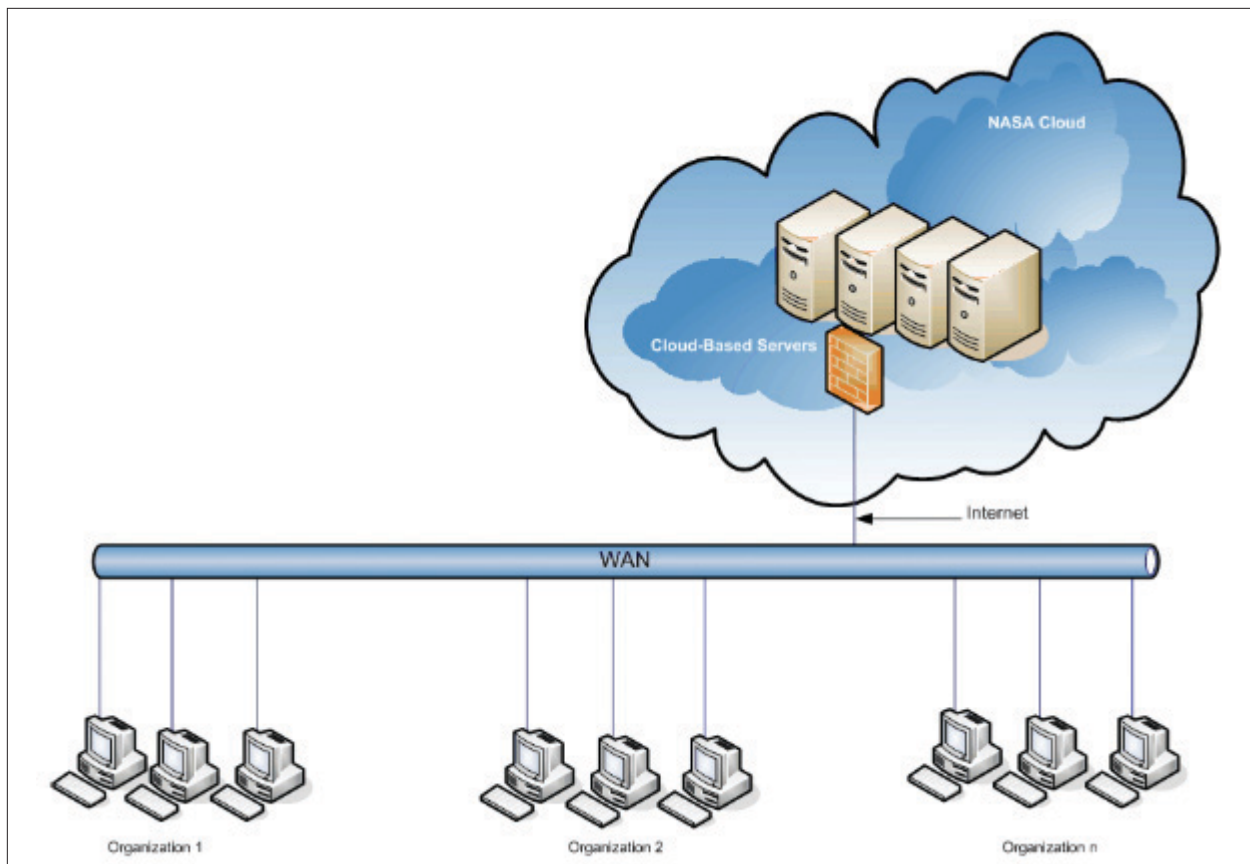
*"If you have an idea, IT Labs could be the medium to get it out to the community and garner interest from others to get their input/funding and further grow the project; very good for visibility, especially to the NASA IT community."*

Andre' Allen, Project Lead

My project's goal was to investigate implications of whitelisting in the NASA cloud, where use of the cloud-based whitelisting is not confined to a specific organization within the Agency.

Whitelisting is one of two fundamental approaches to endpoint security. More specifically, it is one of two approaches to the prevention of malicious software at computing nodes. It is generally assumed—even by vendors of blacklisting products—that whitelisting is far more effective in preventing the execution of unauthorized software; yet, whitelisting is not often used. Whitelisting has not gained traction due to political, technical and human-habit reasons.

Whitelisting systems generally require a dedicated server—real or virtual. Without the use of cloud resources, if application whitelisting were deployed to all NASA organizations, a very large number of hardware devices would be required—scattered throughout NASA. Providing the servers in the cloud should require fewer physical devices, provide greater server management efficiencies and present opportunities for enhanced security.



Application Whitelisting in the NASA Cloud

## ***Application Whitelisting ...continued***

To the extent practical in the short time allotted, my project investigated those and other reasons, and suggested additional issues that could be of concern within the NASA community in regards to Agency-wide whitelisting. It also addressed key Inter-Center and Intra-Center considerations for application whitelisting when implemented at an Agency level.

The highest-level recommendation is that NASA implement an Agency-wide pilot project with sufficient participating nodes at each Center or organization (350+) to cover most typical uses and configurations of computing endpoints.

The purpose of the pilot project is to validate the concepts, approaches, requirements and constraints identified for whitelisting in the NASA Cloud. The pilot project must be of sufficient scope to impact and be evaluated by all major elements of the Agency, including cultural, political, technical and operational.

# ATML & SysML



Project Lead: Chatwin Lansdowne  
 Project Sponsor: James McClellan  
 Additional Contributor(s): Pat McCartney, Lui Wang  
 Base Center(s): JSC

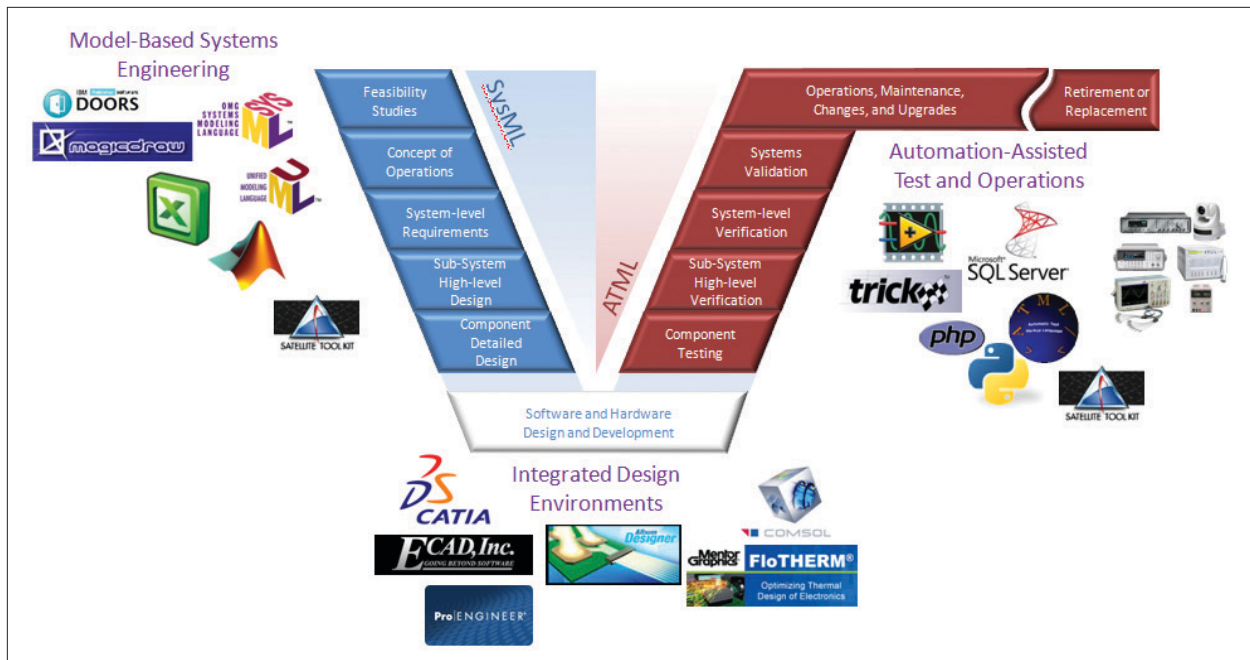
*"Still quite a lot of work to do, but the injection of funding from IT Labs has been very beneficial in research for the project. With it, I was able to buy contractor time that enabled lab testing, via hardware and software use, which allowed for more in-depth researching capabilities."*

Chatwin Lansdowne, Project Lead

Lowering the cost of access to space is one of NASA's grand challenges, and realigning workflow to better use IT resources promises significant leverage. Our project explored the difficulty of automated integration between new tool standards relevant to different program phases. Eventually, deriving from the design (models) machine-readable documents that describe requirements to test, interfaces, wiring, signals and behavior, will enable tools to manage much more of the workflow for verification, validation, maintenance and mission assurance.

The purpose is derivation of Automated Test Markup Language (ATML) documents from SysML design models. The objective is an early examination of tools interoperability, with the intention of feeding back observations to respective standards bodies.

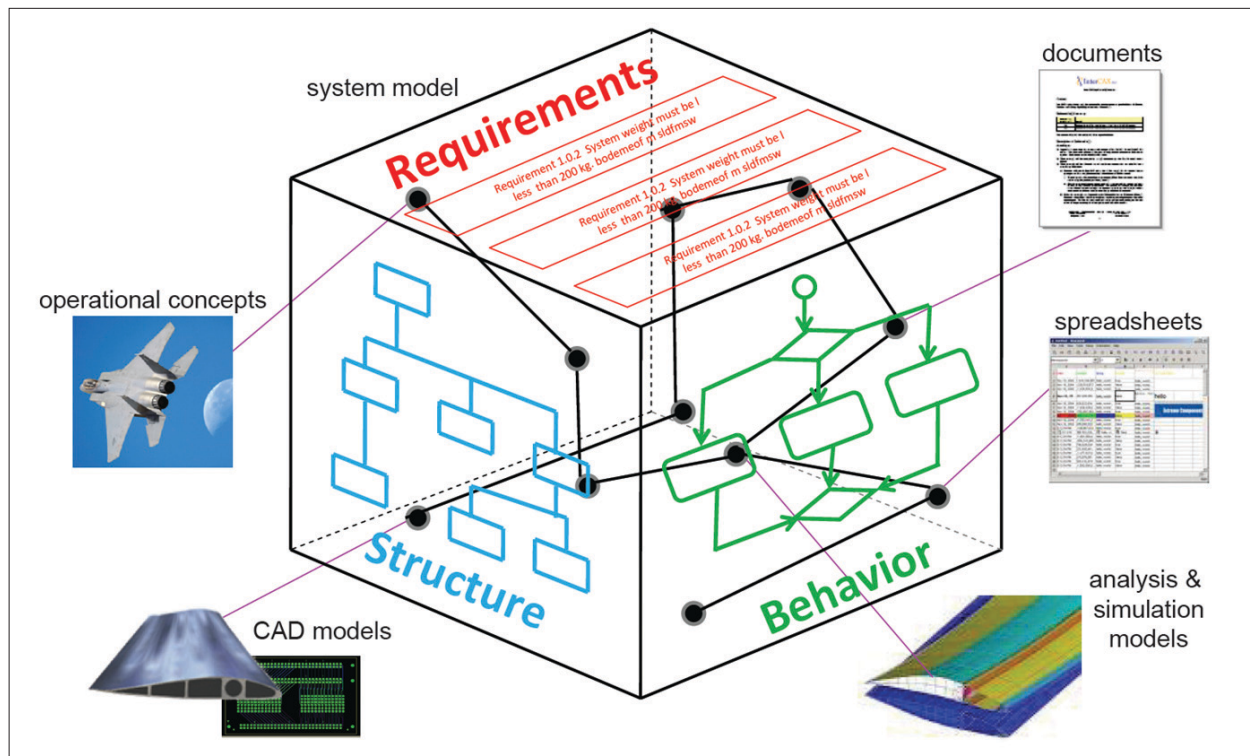
Our team reviewed SysML and XML Metadata Interchange (XMI) formats; built a SysML model of an ATML instance; and evaluated the use of XMI to extract metadata from the SysML model into the ATML format. Despite our initial outlook, more preparation was required on the SysML side than anticipated, so we did not actually generate an ATML document.



## Information Flow Between Tools

Study conclusions from our project are being published at IEEE AutoTestCon 2012. With the help of matching funds from other sources, we additionally were able to demonstrate a webbased harvest of ATML-formatted data in a NASA booth at AutoTestCon 2011 where we focused on demonstrating for standards committee members. Additionally, we were invited to stand up our software orchestration and data harvest technology in a pilot "programindependent" JSC test facility, iPAS (integrated Power, Avionics, Software).

I have continued to explore the ATML information framework this year. In April 2012, I hosted the IEEE Standards Coordinating Committee-20 meeting at JSC where I provided tours of NASA use cases (including iPAS and TS-21) and provided a pitch from Dr. Paul Keller (ARC) on NASA information architecture and our desire for interoperable data format standards. The committee approved opening a new IEEE standard web-based interface for test equipment (I was named chair), and a study of the merit of rebuilding ATML over the NASA information architecture.



*One-Chart Summary for Model Based Systems Engineering*

James McClellan, sponsor for this project, had this to add: "Chatwin Lansdowne had a passion to do something about it and tenaciously explored how NASA could get involved in ATML and SysML as a better, automated way to capture test results and increase the efficiency and speed of testing. IT Labs funded the project, and that in turn got Chatwin enough attention so that JSC Engineering applied additional funds. The result ended in published papers and a trip to the IEEE conference to present. That resulted in an IEEE conference on the subject at JSC this spring, with plans to continue the work. Chatwin has entered into the current round of IT Labs funding hoping to continue the good work."

# CloudLock Prototype

*Project Lead: Stephen Lumsden*

*Project Sponsor: Allison Wolff*

*Additional Contributor(s): Jeremy Wilson, Meredith Mengel*

*Base Center(s): GSFC*

At the time of our project's start, NASA was planning on implementing a new office productivity and collaboration environment, embodied in Google Apps. The environment would enhance the ability of individuals and teams to create and manage content and collaborate seamlessly, while reducing direct and indirect costs. It was aligned with the Federal Government's "cloud first" mandate and the NASA OCIO IRM Strategic Plan.

From this, participation in the Google Apps pilot led us to suggest a prototype evaluation of CloudLock to test whether or not its features were suitable to mitigate concerns of security of sensitive data. CloudLock enables [role based document access control, auditing and alerting] within the Google cloud environment; it runs on top of the Google Apps engine and provides a means to safeguard and manage digital assets in the Google cloud.

The environment itself represents a new paradigm, one that multiplies opportunities and benefits, but which requires a new model for governance and risk management. In particular, the tools used to safeguard data on premise are not applicable for Google Docs and Sites, or for any cloud environment for that matter. This is partly because they are not designed for the cloud, and partly because the fundamental risk to data in the cloud—the dynamic and live sharing of files with unauthorized users—is not a technologically available feature of onpremise computing. On-premise security tools have not evolved for the dynamic sharing functionality of Google Docs and Sites. In addition, the ownership of files shift, from the device to the user, as migration from on-premise computing to Google Docs cloud computing takes place.

The subject of our business case was the CloudLock e-Discover, Governance, Risk and Compliance (eGRC) solution, which would give the visibility and control required to operate the full functionality of the Google environment and obtain its full ROI. CloudLock is a cloud product, sold as an annual SaaS subscription, designed for large Enterprises and Agencies. The pilot for this project was tested within the Flight Project Directorate of Code 400.

One of the major successes we experienced was being able to monitor where our data is and who has access to it, leading to some alleviation of the concerns about security of sensitive data.

# Collaboration Application Interoperability



*Project Lead: Allison Wolff*

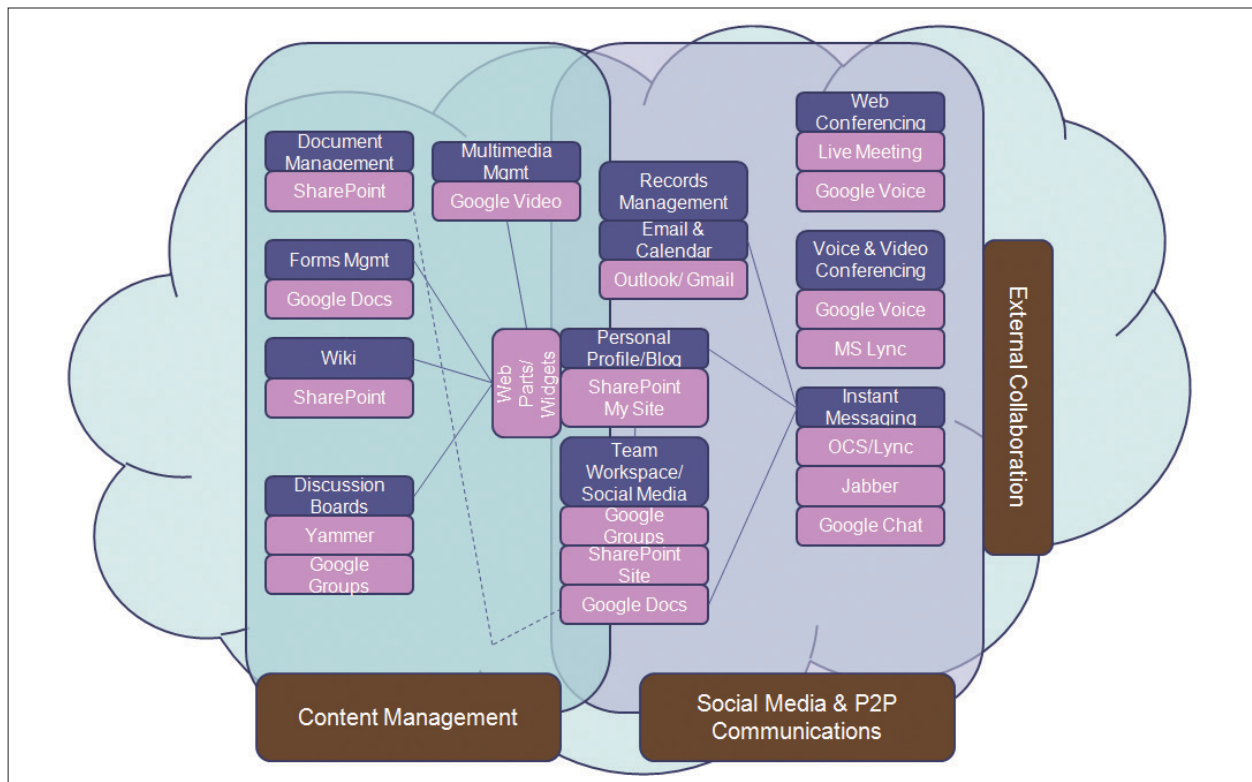
*Project Sponsor: Allison Wolff*

*Additional Contributor(s): N/A*

*Base Center(s): HQ*

Our project proposed the following: to evaluate hosted collaboration application solutions that centralize multiple Agency collaboration architecture functional requirements; to initiate a repeatable process for application innovation/integration within the NASA architecture; to architect solutions for prototype development that integrate separately hosted cloud collaboration application environments; and to validate multiplatform collaboration architecture to be proposed as a possible future architecture for the I3P ES&ID office.

It was intended to leverage a combination of new and existing applications and was a hybrid of cloud-based and internally-hosted services.



*Example of CTO-IT Lab Architecture Prototype*

We initially proposed three phases: phase one was the initial evaluation of environments; phase two was for mapping solutions and formulating an integration strategy; and phase three was for presenting findings and recommendations. Efforts for this project were instead rolled into the Google Apps “roadmap” (project).

See the *Google Apps Pilot* project described later in this section.



# Collaboration Search Portal



Project Lead: Allan Stilwell

Project Sponsor: Allison Wolff

Additional Contributor(s): David Johnson, Sarah Berndt

Base Center(s): JSC

*"Love the concept and approach of the program and believe it is a great idea, and hope that it is something that continues along the same conceptual path. When you spend less money on failing, you realize the failure sooner than later, and you learn something from it; this helps in future success."*

Allan Stilwell, Project Lead

After years of attempting to consolidate our collaboration systems unsuccessfully, we finally determined that Federation would probably be a better approach, at least in the interim until the environment was right for consolidation. But we had trouble in beginning to Federate different collaboration technologies and different approaches.

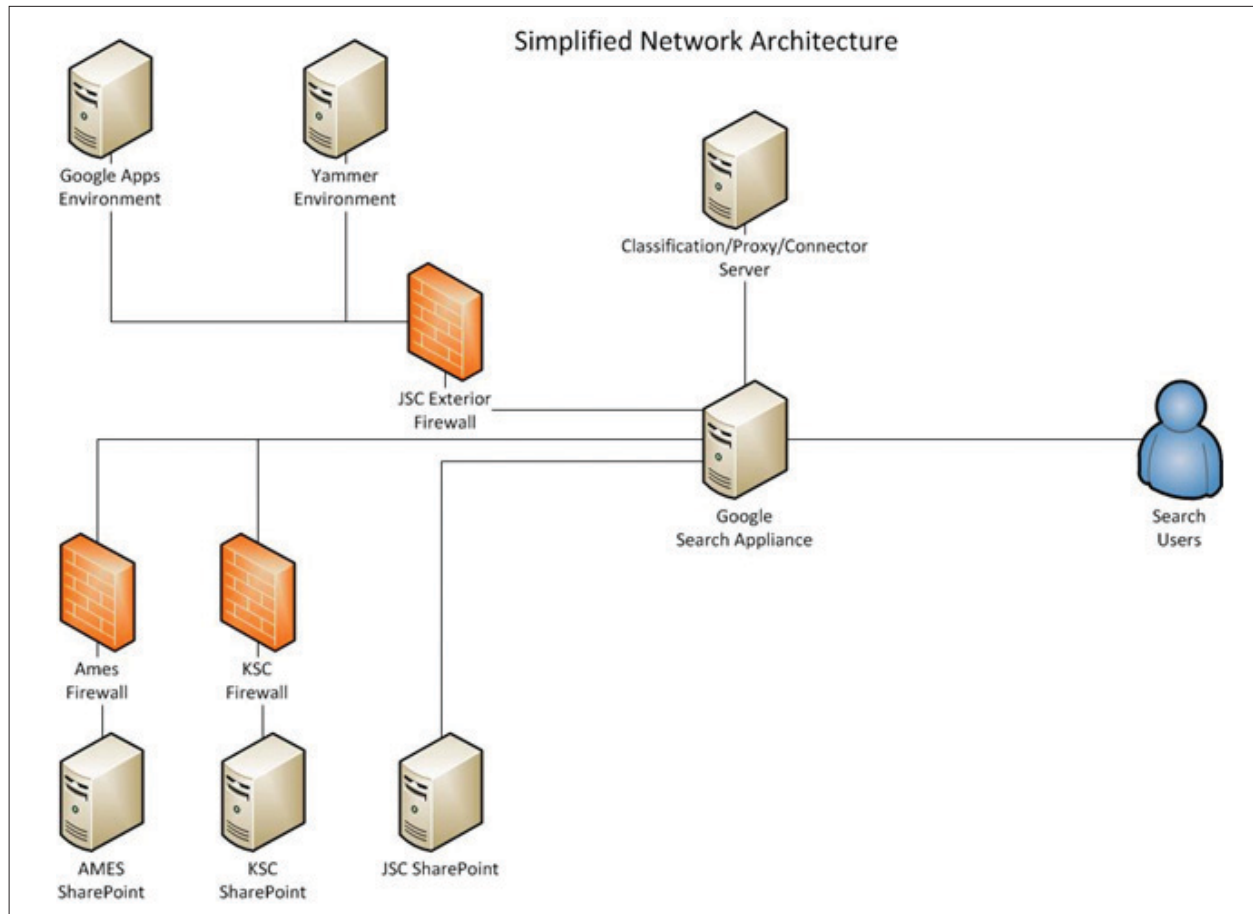
We determined that the most effective way to quickly Federate was at the search level (centralized search as a means of Federating). By evaluating a way to do that and integrating some additional components, we could make search and finding things easier (e.g., secure authenticated search, custom search results based on profile information, etc.).

From this line of thinking, I was approached by Allison Wolff, sponsor for this project, to lead efforts in creating a collaboration search portal. We wanted to create a framework that would allow users to find information within all the different collaboration environments across the Agency.

Often users have to know exactly where something is in order to find it. We wanted to provide one central place to look for anything within the collaboration environment and that would take the user where they need to go without having to know a specific locale.



Screenshot of Search Portal Design (Various Centers)



**Simplified Network Architecture**

We developed requirements, a design and a project plan for the envisioned search portal after thorough research and collaboration with Google representatives, the Yammer engineering team and SharePoint representatives from other Centers—JSC, KSC and ARC. JSC is interested in seeing the portal, and is configuring their SharePoint environment to meet our needs. KSC is even integrating our recommendations into their upcoming SharePoint 2010 architecture.

Some of our findings included: a detailed design produced can be implemented in the current environment; a low level of awareness of unified search systems exists; and the fact that search systems are not being used across the Agency.

From our research and testing, we recommended the following: that the OCIO perform outreach to inform users of search capabilities in the Agency; that the OCIO investigate a blanket licensing or Agency purchasing agreement with a search vendor; and that our project be pushed to the pilot phase, as it will provide a useful product and will help demonstrate the benefits of semantic and Federated search to the Agency.

# Collaborative Action Management Using GQueues



Project Lead: Larry Trase  
Project Sponsor: Allison Wolff  
Additional Contributor(s): Rhonda Arterberrie,  
GRC Flywheel Team  
Base Center(s): GRC

*"I think IT Labs is a very powerful tool for innovation. The program allows research and experimentation, and empowers PMs to try new products or applications without major burden due to IT administration and IT implementation details."*

Larry Trase, Project Lead

The objective of my project was to implement a task management process using the power of a collaborative environment such as Google Apps. My desire was to minimize the need for meetings to establish actions and provide a way to easily initiate actions and track their progress.

I decided on GQueues, an off the shelf, TRL 8 add-on that enhances the Google Apps task capability. It is an action item tracking tool which is used to add to collaborative efforts. I envision this as being a fleet leader for the process of incorporating commercially available third party add-ons to the NASA Google Apps environment.

The screenshot displays the GQueues web application interface. On the left, a sidebar contains navigation menus for 'My Queues', 'Smart Queues', and 'Friend Queues'. The main content area shows a list of tasks under the heading 'G6\_PTR#3\_Deliverables'. Each task entry includes a number, a title, a list of assignees with their email addresses, and a due date of 'Jun 22'. The tasks are numbered 14 through 21. Task 21, 'Software Compliance', lists several sub-items: 'Software Development and Management Plan (?)', 'Software Safety and Assurance Plan (Thong Luu)', 'Software Test Procedure (?)', 'Software Design Description (?)', and 'NPR 7150.2 Compliance Matrix (Hunker/Luu)'.

Task ID	Task Title	Assignees	Due Date
14	Motor Analysis	glenn.r.lindamood@nasa.gov, naeem.ahmad@nasa.gov	Jun 22
16	TD Bearing Analysis	robert.t.tornabene@nasa.gov, glenn.r.lindamood@nasa.gov	Jun 22
17	Feedthroughs & Connectors	yaritza.dejesusarce@nasa.gov	Jun 22
18	Rotordynamics Analysis	kirsten.p.duffy@nasa.gov	Jun 22
19	Vacuum Analysis	ronald.j.koenig@nasa.gov	Jun 22
20	Backup Spring/Damping Analysis	kirsten.p.duffy@nasa.gov	Jun 22
21	Software Compliance	Software Development and Management Plan (?), Software Safety and Assurance Plan (Thong Luu), Software Test Procedure (?), Software Design Description (?), NPR 7150.2 Compliance Matrix (Hunker/Luu)	Jun 22

GQueues Screenshot

Originally, I proposed the concept for this project and found the appropriate software that would help accomplish my goal. As I was based out of GRC, I decided to take advantage of a team that was already working on another project—the GRC Flywheel team—which was attempting to replace batteries with a flywheel in order to outperform the batteries. The help and feedback from this team was essential in testing out the task management process.



## Collaborative Action Management Using GQueues ...continued

As with any project, there are often setbacks that present themselves—change often being one of these. At the project's start, our team was not able to immediately launch due to the proposed software not being available; as a temporary substitution, spreadsheets were used to keep track of the required information. Though it took only a few short weeks to acquire the software and full user capabilities, the midway conversion from spreadsheets to the intended GQueues software required synergistic adaptation from the team to fully grasp the new collaboration tool and move away from the established method.

Despite the initial setback of adapting to the intended software, the software was successfully tested with 25 members of the team. Work was performed, tasks were tracked accordingly and collaborative power was shown in the ease and usability of the software.

The screenshot displays the GQueues software interface. On the left, there is a sidebar with 'Smart Queues' (Inbox (0), Assignments (5), Overdue, Due Today, Due in a Week, All Items) and 'Friend Queues' (anthony.l.nerone@nasa.gov, karin.e.bodnar@nasa.gov, ralph.h.jansen@nasa.gov). The main area shows a 'To Do' list with five tasks:

- Put together summary of current density for motor** (MECH, Motor) - Mar 28. Description: 1) From JSC Vacuum wire rating, 2) Reference from YES corp, 3) From reference supplied by Kirsten 4) Email Glenn 5) Email George. Assigned to: naeem.ahmad@nasa.gov : Mar 27.
- Modify motor sizing block** (MECH, Motor) - Apr 4. Description: 1) switch motor sizing to method which uses flux linkages, 2) highlight inputs from EM model in different color, 3) organize section of inverter outputs into: parameters at max speed, parameters at min speed, and required inverter ratings, 4) add slot area as on output based on current used in EM model, acceptable current density, and fill factor, 5) add wire length estimation based on length of lam stack and estimate of end turn length 6) add I<sup>2</sup>R losses based on current, current density, area resistance of copper, and turn length. Assigned to: naeem.ahmad@nasa.gov : Apr 16. Note: This was completed earlier, but didn't "check mark" it.
- Bearing Analysis** (MECH, TDBrg) - Apr 13. Description: Select bearing based on analysis and availability from commercial vendor. Assigned to: robert.t.tornabene@nasa.gov : Apr 12.
- Develop Matlab Code for Windage Losses of Rotor** (Housing, MECH) - Apr 13. Assigned to: robert.t.tornabene@nasa.gov : Apr 12.
- Calculation of number of turns in motor** (MECH, Motor) - Apr 16. Description: 1) Make a calculation based on maximum flux linkage from flux linkage surface (l, theta), make power point slide explain method 2) Make a calculation based on  $\tan(\theta) = \text{sort}(\text{saliency ratio})$  ? for optimum optimal power factor control make power point slide.

GQueues Screenshot

Though the flywheel project was very specific, I believe the results of the testing made it worthy for consideration for project teams throughout the Agency—a larger goal I also hoped for when starting this endeavor. To date, testing is still in progress and an outbrief is scheduled for later this year.

# Collaborative Social Intranets and Extranet Using Google Apps



Project Lead: J.J. Toothman  
Project Sponsor: Allison Wolff  
Additional Contributor(s): Emma Antunes,  
Estelle Dodson, James Hodgskiss,  
Marte Thompson, Jon Verville  
Base Center(s): ARC

*"IT Labs holds immense value. The challenging thing at NASA is executing ideas (funding, obtaining resources, etc.); this program is a great place to 'test the waters' on ideas and it also provides an entrepreneurial spirit within the technology community. Originally, I was trying to find a way to experiment with the technology used in this project, but was challenged by own set of responsibilities (time, tasks, etc.) and had no helping hands. IT Labs was great in providing me with a small funding source and a mechanism to obtain proper resources to execute my idea effectively."*

J.J. Toothman, Project Lead

Intranets have evolved and been redefined from what they were 10 years ago—static, portal websites which a few users with proper privileges had the ability to update. Today's modern intranet is an association of content maintained and managed by users across the Enterprise using a loosely pre-defined structure that is tied together by search and metadata technologies. Modern intranets are also increasingly utilizing social web behaviors, including threaded commenting. The surfacing of user activity streams can be aggregated to establish an Enterprise "river of news".

The Google Enterprise Apps suite contains a number of functional applications which could potentially be used in the development of an updated intranet to replace InsideNASA. These applications include the Google Sites web publishing solution as well as the social network product Google+.

My project explored the utilization of Google Sites and Google+ as a modern social intranet replacement for the current InsideNASA intranet. This exploration was performed through the development of a prototype intranet under the existing Google Enterprise Apps pilot.

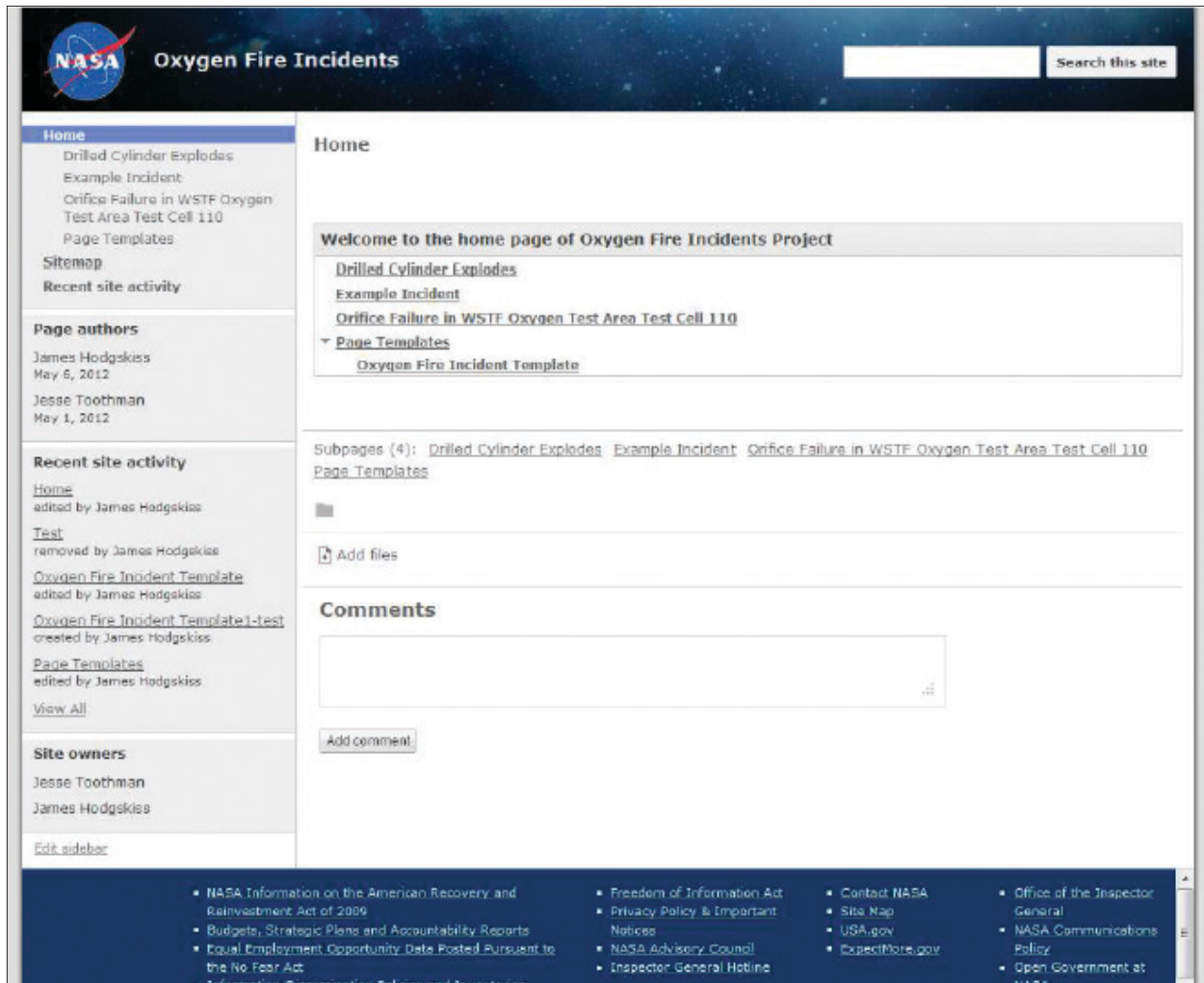
The screenshot shows the InsideNASA website interface. The top navigation bar includes the NASA logo, the text "InsideNASA", and a search box. The left sidebar contains a menu with links to Home, Administration @HQ, Centers, Communities and Teams, Education, Employee Resources (highlighted), Financial Resources, Information Resources, NASA Lessons Learned, POPS Expertise Locator, Science, Sitemap, and Recent site activity. Below the menu are sections for Page authors (Jesse Toothman, April 13, 2012), Site owners (Matt Antoun, Jesse Toothman, Chris Antoun, James Hodgskiss), and Recent site activity (Contact Us, edited by James Hodgskiss, DevOps, Outreach Office).

The main content area is titled "Employee Resources" and is divided into several sections:

- Employee Health:** Includes links to NASA Occupational Health Program, NASA Employee Assistance Program, CHECKBOOK — Guide to Health Plans for Federal Employees & Annuitants, Federal Employee Health Benefits — Office of Personnel Management, healthfinder®, Department of Health & Human Services, Guide to Reliable Health Information, and Health.gov — U.S. Department of Health & Human Services, listing of multi-agency health initiatives and activities.
- Employee Quick Links:** Includes links to Human Resource, NASA People Home Page, NASA Employee Express, and WebTADS Time & Attendance System.
- Purchase Deals For Federal Employees:** Includes links to Auctions (FirstGov), Dell Computers/Federal Employee Discount, Fleet Vehicle Sales (GSA), and HP Computers/Federal Employee Discount.
- NASA Culture Survey:** Includes text about the 2007 NASA Cultural Survey, stating that approximately 30% (5408 out of 18152) of NASA employees responded during that time. The analysis of the survey results was part of a broader study that included focus groups, center assessments, literature searches and the additional comments provided by survey respondents. The overall findings were presented at a Senior Management Council in January 2008, and a determination was made that more can be expected.
- Federal Holidays 2012 Calendar:** Includes a table with the following data:

Monday, January 2*	New Year's Day
Monday, January 16	Birthday of Martin Luther King, Jr.
Monday, February 20**	Washington's Birthday

Inside NASA Screenshot



**Inside NASA Screenshot**

My exploration of Google Sites also included the investigation of Google Sites in an extranet capacity. By using the use cases and content within wiki.nasa.gov, I developed an additional prototype to explore feasibility of using Google Sites as a solution to allow NASA personnel to collaborate and share information with trusted external parties. In addition to the prototype, I proposed a recommendation for approach for extranet governance and operational management.

NASA will benefit from these efforts by potentially leveraging Enterprise software features of Google Enterprise Apps. The Agency is primarily investigating Google Apps for collaboration features such as Google Docs, but there is no additional cost for the utilization of Google Sites and Google+ features. However, there are significant savings in utilization of these tools by eliminating the software and vendor management costs of the existing InsideNASA and wiki.nasa.gov solution.



# Communication & Collaboration Lab



*Project Lead: Estelle Dodson*  
*Project Sponsor: Allison Wolff*  
*Additional Contributor(s): Sonie Lau, Michael Sims, Jon Welch*  
*Base Center(s): ARC*

*"IT Labs is a great way to explore ideas in a supportive environment while planning for future development phases that can be easily implemented to upfront considerations."*

Estelle Dodson, Project Lead

As science questions become more challenging, missions increase in complexity and big data exceeds visualization capabilities on a desktop machine, the ability for groups to interact and collaborate in a large, high fidelity visual environment is important.

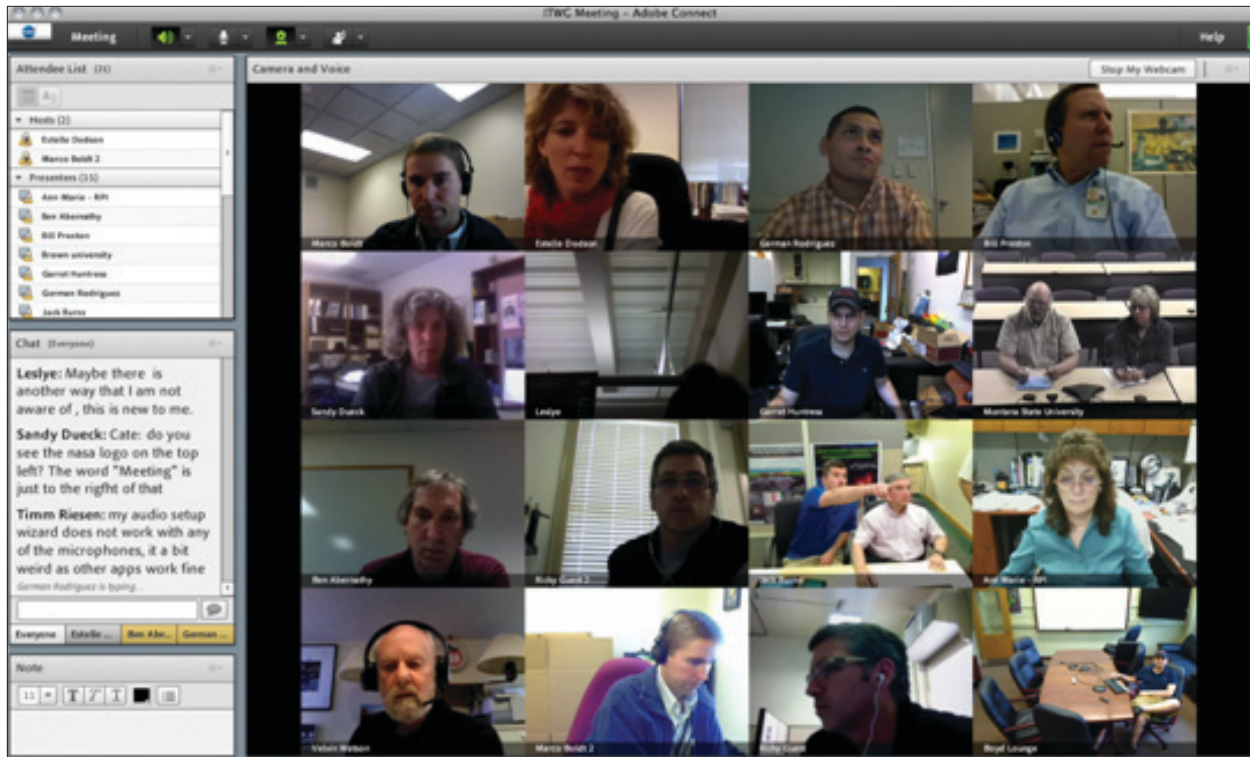
Our project addressed the visualization capabilities and collaboration opportunities through the building of a Hyperwall tiled grid and highly interactive display. It uses the open source software Scalable Adaptive Graphic Environment (SAGE), which supports inputs from multiple computers and tablets to be displayed and interacted with on a large tiled display, as well as mirroring the display to other remote sites.



**NASA's Endurance Project**

From observing proposal teams and MER mission and science operations teams, the need for and value of a large and multi-person interactive display system was apparent. Of greater value still would be the ability for two systems to connect and share screens to facilitate remote team interaction.

We successfully built a prototype from start to finish in three months, on time for the IT Summit and TEDx talks in San Francisco in August of 2011. We were driven by building the prototype and demonstrating it at the NASA IT Summit. A TEDx talk was also given highlighting the value of large interactive systems to reduce travel, break down borders (disciplinary as well as geographical) and support collaboration.



### *Collaborative Meetings*

Through the life of the project, we collaborated and leveraged existing relationships with: Calit2/UCSD/UC Irvine, Carnegie Mellon University, University of Illinois' Electronic Visualization Laboratory, Lockheed Martin's Solar and Astrophysics Laboratory, Stanford University (Research scientists and the Persuasive Technologies Lab) and NASA's Virtual Institutes.

Some of our findings included: determining that users were not aware of, or did not know how to use the technologies; current tools' usefulness could be increased greatly with small changes; there was no easy-to-use collaborative drawing tool that allowed scientists to sketch and write equations remotely; and that there was a huge community of environmental and ecological scientists using GigaPan imaging to monitor field sites.

Though our project does not have Enterprise-wide impact, it does have value as a Center capability for groups that need better visualization capabilities and interdisciplinary teamwork for the following reasons: scaling an image down or zooming into a small fraction of a feature as displayed on desktop machines are not optimal for perception of objects and images and even large documents and spreadsheets, given the complexity and scale of the work NASA performs and the challenges in visualizing "big data"; Hyperwalls and extreme connectivity will allow for dealing with remote team members as if they are in the same room—people and teams can work together regardless of data and computation location; and the technology is emerging and we will soon see an increase in adoption as electronics and open source systems reduce costs and systems become widely available.

# Drag-Drop-Sync-Share



*Project Lead: Manson Yew*

*Project Sponsor: Tomas Soderstrom*

*Additional Contributor(s): Gabriel Rangel, Luke Dahl, Ricky Ma, Khawaja Shams*

*Base Center(s): JPL*

Our project explored the issues and ideas related to Drag-Drop-Sync-Share (DDSS) tools such as DropBox and its uses in the Enterprise in response to NASA's growing mobile workforce dilemma. While originally taking our cue from the growing segment of DDSS applications and its usage for backup, device management and personal cloud storage, we uncovered an enormous demand across NASA for secure mobile collaboration, and the part that DDSS plays in this. We also uncovered the growing limitations on mobile collaboration and the significant risk of driving our mobile workforce toward non-approved products in the marketplace.

Mobile workers include those who attend multiple meetings daily, telecommuters, heavy travelers and/or those who are on longer-term, temporary assignments. In fact, we were hard pressed to find personnel who have not required approved, personal time off during working days (e.g., doctor's appointments or picking up kids) and have invariably received calls from work in which there would be a need for some type of work from an offsite location.

DDSS also provides novel efficiencies for some of the most critical meetings and reviews. Some of the costliest and most important meetings at NASA are the face-to-face meetings and reviews that gather together virtual teams from different Centers and different parts of the country. The preparation of the agenda and distribution of the latest version of the agenda are critical orchestration activities that ensure effectiveness and high return on investment from such meetings.

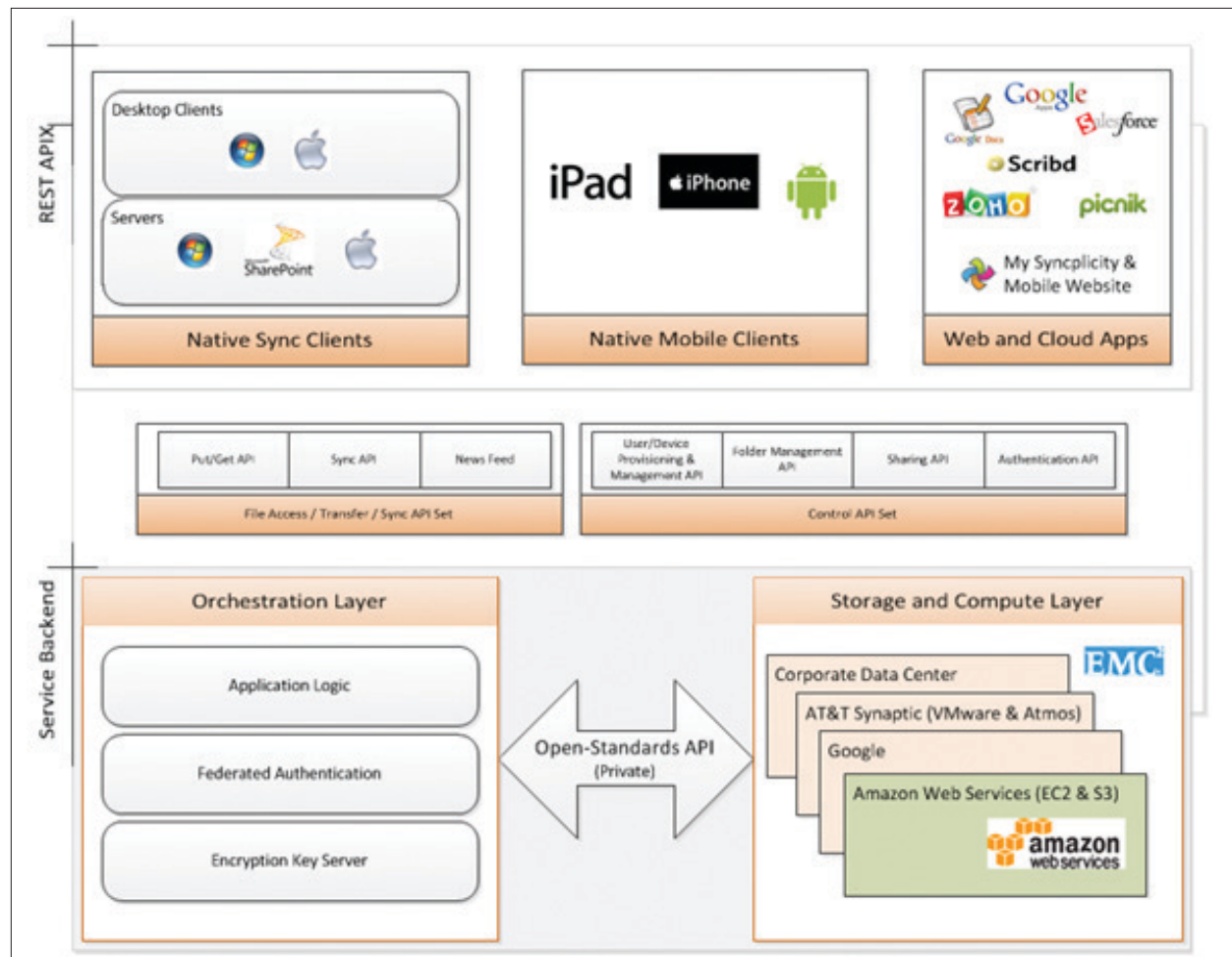
Unfortunately, more often than not, participants arrive with multiple, conflicting versions of the agenda. Furthermore, the collection of the presentation materials and most often such meetings expend valuable time throughout the meeting doing the "flash drive two-step" to get the latest version onto the presentation computer. After the meeting, there is usually a time lapse before the presentation materials are distributed to participants—if they are distributed at all. Using DDSS tools provide some of the most elegant and streamlined approaches for collaborating on the agenda, distributing the latest version, collecting the latest versions of presentation materials and distributing the latest collection of meeting documents.

We further delved into the issues faced by NASA users and solutions from the current and emerging approaches for DDSS. This research included evaluating market-leading COTS and homegrown solutions as well as current regulatory and technical limitations. The result was a recommendation for addressing this need by partnering with a promising vendor that provided a unique approach for addressing the key functional requirements and regulations for providing secure mobile collaboration through an Enterprise-class, DropBox-like capability.

We evaluated multiple products to better understand their individual strengths and differences, which included: SugarSync, DropBox, iCloud, Box (box.net), Share+, Adobe CX, and Whale Drop.

We discovered that while there were NASA personnel who were formally and informally using these products, none of the above products meet the basic IT security requirements necessary for managing NASA internal information. In addition, we discovered that there were privacy and protection of Personally Identifiable Information (PII) concerns that would exclude certain approaches in this segment, including the ubiquitous DropBox.

Our studies also led us to conclude that the industry has come to a consensus 3-tier architecture. The differences are not in technical approach, but in user interface, business model, user management policy, depth of advanced features, selection of encryption and transport layer and available clients and APIs.



**Clients and Layers**

We found only three viable solutions for secure mobile collaboration currently worth further evaluation: custom development, Accellion, and Syncplicity—on our own private cloud, such as Gov Cloud.

Currently, Syncplicity is the only solution that is designed for Enterprises to use their own cloud storage, such as Amazon, Gov Cloud and their own Enterprise identity service. Thus, they were unique in meeting Federal security requirements for internal Federal government data. In addition, while promising, DDSS still poses several, critical unanswered questions that require further evaluation in the NASA environment. Syncplicity's cost model as an elastic Software as a Service (SaaS) allows us to initiate a proof-of-concept in the NASA environment with lower costs.

Our successful exploration and discoveries experienced in our project has allowed us to continue our efforts in the form of a proof-of-concept. Near-future plans involving this continuation is described in *DropBox for the Enterprise: Secure Collaboration for Mobile Workers in the Upcoming Projects* section.



# Google Apps Pilot



*Project Lead: Allison Wolff*

*Project Sponsor: Allison Wolff*

*Additional Contributor(s): Rhonda Arterberrie, Meredith Mengel, Rajesh Pandey, David Valliere, Julie Wodrich; Pete Kassab & Thani Sokka (Google); Michael Donovan & Steve Vetter (HP)*

*Base Center(s): HQ*

Our Google Apps pilot evolved from the Collaboration Application Interoperability project (see same-titled project described previously in this section). We requested and received authorization from the IT Management Board to conduct a collaboration face-to-face with subject matter experts from across the Agency to better define NASA's IT collaboration requirements. Our deliverables were goals for collaboration at NASA and the beginning of a business case for Google Apps in early 2011. We had representatives from security, network, Enterprise Architecture, NOMAD, etc. and held a facilitated discussion on goals for collaboration.

The following are the NASA collaboration goals we developed:

- Ensure alignment with NASA mission by ensuring collaboration solutions are efficient, secure and cost -effective
- Continue working to understand and anticipate customer needs and develop ways to dynamically meet these needs
- Maintain support for IT innovation initiatives
- Support Federal and Agency goals in implementing cloud efficiencies
- Promote a culture of collaboration at NASA by making information and expertise more discoverable
- Better meet customer needs by streamlining the processes for collaboration technology acquisition and integration
- Work toward the vision of any information, any device, any time

We constructed the business case for Google Apps in support of these goals. We then received authorization to proceed with the Google Apps prototype based on the results of the faceto face endeavor.

We established a project team and worked to set up the NASA domain in the Google Apps for Government environment. From there, we ran a full scale prototype with 500 end users.

Upon conclusion of the prototype, we conducted a survey that inquired on the users' use of certain Google features as well as their feedback and commentary. These results helped in making the decision to proceed further in our efforts. The following features and their usage percentages were identified:

- Google Docs – 100%
- Google Sites – 37%
- Google Groups – 42%
- Contacts – 24%

Also in the survey, the following question was posed: How does Google Apps help you do your work more effectively? Responses included: simultaneous document editing makes collaboration easier and helps with versioning issues; easier to collaborate with folks across the Centers and outside NASA; access from anywhere on any browser; and it provides a central location for team information.

Results from this survey helped in receiving authorization to proceed with a pilot.

# High Performance OpenGL Graphics on a Virtual Desktop



*Project Lead: Thomas Diegelman  
Project Sponsor: James McClellan  
Additional Contributor(s): Members from Operations Technology Facility  
Base Center(s): JSC*

*"IT Labs is great for generating interest in a project by garnering funding, even small amounts; goodwill and enthusiasm is also created when someone is willing to provide some funding and/or equipment donations, etc."*

Thomas Diegelman, Project Lead

High performance graphical modeling and simulation plays a key part in the engineering, operation and training work done by NASA. Many of the products used in this fashion depend upon OpenGL, the leading cross-platform 2D/3D graphics application programming interface (API). The workstations required to run these products tend to be expensive, large and have high power and cooling requirements. As a result, these machines are neither portable nor flexible in a working environment where the rise of virtualized and mobile computing platforms has created demand for both features.

Our project sought to evaluate a hardware/software PC-over-IP (PCoIP) solution using technology from Teradici to enable high performance OpenGL graphics on a thin or zero client.

The Operations Technology Facility (OTF) acquired an evaluation kit for this technology and a small scale client/server setup was created to test scenarios that were more demanding from a networking and computing perspective—replicating a variety of local and remote use cases. In all tests, the primary criterion for evaluating the efficacy of the solution was the quality of the user experience in terms of performance, application responsiveness and ease of use when running applications in the software test suite. Testing of the underlying PCoIP technology has been and continues to be conducted at JSC; however, this proposal focused solely on high performance OpenGL graphics utilization using PCoIP.

In seeking to find efficient and effective ways for enabling high resolution graphics remotely on portable devices, we had to remain aware of bandwidth limitations, processing requirements and avoiding bottlenecks. Through this awareness, we were able to stay focused on that purpose, and avoided the usual project issue of scope creep.

Though we avoided the typical scope creep, our project was not without its setbacks. First, in the beginning stages, we could not find anyone that was looking extensively into reduced footprint graphics for remote control applications. Second, we knew there were tools out there that we could buy, but we were not sure of how well they would work and be able to be incorporated into a suite (e.g., how Microsoft Office products work together). Third, because of evolving technology it was not completely clear what the final product "looked like" (e.g., 3G to 4G LTE).

Despite our setbacks, we successfully ran a demo of the intended application; though we do deem it necessary to demo to users for different, broader requirements for the application.



# Identity Management Prototype

*Project Lead: Henry Hotz*

*Project Sponsor: Tomas Soderstrom*

*Additional Contributor(s): Paul Bleiler, Manson Yew*

*Base Center(s): JPL*

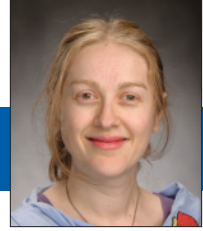
How information systems authenticate users for access has evolved over the years. In the beginning, each system would keep a local list of users and their username and passwords; in fact, the simplicity of this approach means that many systems still employ this mechanism. But this forces users to remember their username and passwords for dozens of different systems, presenting usability, provisioning, operations and security issues.

A further evolution provided a gold source Enterprise directory that information systems in the Enterprise can “subscribe” to the Enterprise directory. While this addressed usability, provisioning, operations, and security issues, systems needing to provide access to users who are not in the Enterprise directory presented significant problems. Technology responded with a variety of approaches for Federated ID—the ability for systems to use multiple identity providers (IDP) to authenticate users. Our project evaluated the state of the industry for Federated ID and Federated ID management, the issues and the NASA use cases where Federated ID management is more critically needed.

We evaluated the major technological components for Federated ID management, including: Shibboleth, OpenID and OAuth and implementation in such products as Microsoft Active Directory Federation Service, OpenSSO, and Ping Identity. We also uncovered lessons learned from JA.net and Eduroam, and other early attempts at Federated ID management. This uncovered various unforeseen issues due to multiple identities, identity theft and revocation of trusts within networks.

Utilizing existing information security models, it appeared that user-centric, lightly vetted Federated ID is not compatible with many NASA information systems; further, the roadmap for NASA ICAM to provision through the Federal Bridge provided the authoritative solution. It further evolved as it became clear that the underlying need for Federated identity at NASA is perhaps in the area of providing SaaS and cloud-based services for NASA tasks. Our resultant white paper—a summation of our research—will summarize the concepts critical to the recommended approaches for Federated ID management across NASA.

# Integrated Data Application Prototype



*Project Lead: Irene Tollinger*  
*Project Sponsor: Ray O'Brien*  
*Additional Contributor(s): Matt Sharpe*  
*Base Center(s): ARC*

*"Thanks to the small amount of funding from IT Labs,  
we can take better advantage of stored data, supporting  
existing processes in a more reusable way."*

Irene Tollinger, Project Lead

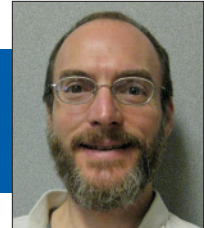
Frequently NASA integrates engineering-related data either manually via spreadsheets and PowerPoint charts or by copying it out of an authoritative source and into another application. This has led to out-of-date data with discrepancy rates as high as 40% (Cx Lessons Learned). Also, data often is stored across multiple file repositories (e.g., SharePoint, Windchill, etc.).

The integrated data application allows engineers to create an engineering story by weaving together data, field by field, as data snippets loaded in real time from external systems. For example, test plan "X" from SharePoint (user pulling in title, description, owner, etc.) is related to subsystem "Y" housed in Windchill (with related hardware sub-components shown), which is related to problem "Z" against a given sub-component in a problem reporting system (Mission Assurance Systems).

Our prototype drew on an existing production backend integration technology developed for Constellation and deployed for ISS, Data Integration Technology (Dig-IT), to demonstrate a future state for programs and projects. It shows how data from multiple sources is queried and displayed in real time with persistent links to external data. Dig-IT relies on native web service APIs provided by COTS tools (e.g., Windchill, Xerox NX, and SharePoint) without any changes to those source systems.

Overall, the work can serve to improve data integrity by replacing static information (e.g., PPT charts) with live data in authoritative systems and reduce costs by eliminating manual work.

# Interoperability Interfaces for Mission Support Cloud Services



*Project Lead: John Wilson*

*Project Sponsor: Lawrence Freuding*

*Additional Contributor(s): Luke Dahl, Shaun McWherter, Matt Miller, Ben Pearson, Peter Shin, Mark Skoog*

*Base Center(s): DFRC*

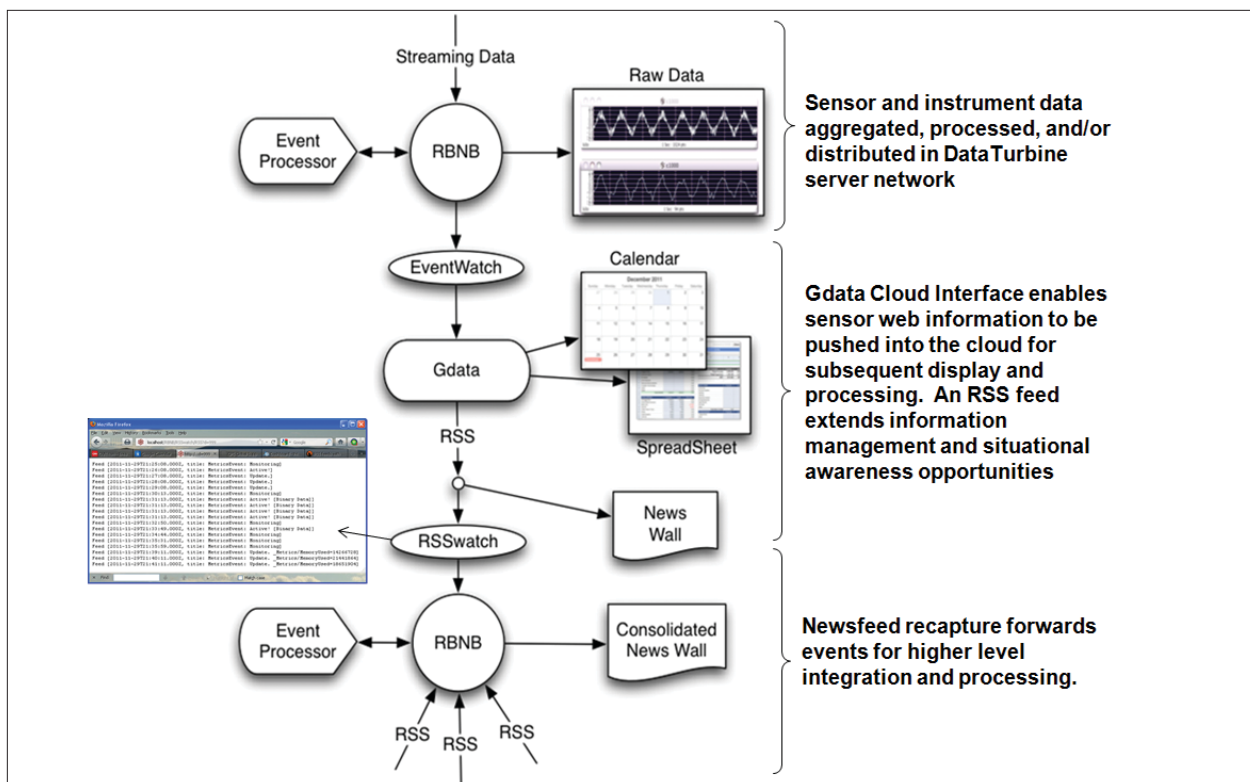
For this project, we were directed to investigate Enterprise architectures and cloud computing technologies relevant to NASA's mission; more specifically, Enterprise architecture technologies for flight mission support and prototype cloud service interfaces to DataTurbine (DT) servers. This investigation was also for situational awareness and was tailored towards DFRC.

We needed to see what services were available and explore the basics of how they work. We also needed to find out how might these services integrate with—or replace—DT technology.

Some of the cloud-based services we investigated included: Google App Engine (platformasaservice), Google BigTable, Amazon Elastic Compute Cloud (infrastructureasaservice), Microsoft Azure (platform-as-a-service), Apache Hadoop (distributed processing) and Apache Hbase (distributed database). From our research, we found that the three major contenders for cloud platform services were Google App Engine, Amazon Elastic Compute Cloud and Microsoft Azure.

We also investigated SharePoint at DFRC (migration of SharePoint technology from JPL to DFRC). It became a place to collect various kinds of data, from project plans to real-time data feeds—a “NASA Earth Science Cloud” portal. With this investigation, we implemented FlightWatch, which monitored flight data in DT and posted events to Google Calendar, which subsequently were published as RSS feeds and were displayed on a page on the DFRC SharePoint Gateway.

In investigating cloud-based service interfaces to DT, there was much to be explored. One example of this was the ability to create an interface that sent flight data from the DT server into a Google spreadsheet; as it was being updated in the server, it was updated in real time in the spreadsheet.



*Architecture: Cloud-Based Interfaces to DT*

A few key important items of note that we learned from this project were: cloud storage (BigTable) is a nice parallel to DT technology; DT can function well in the cloud computing world, as we were able to demonstrate various aspects of this; and integrating DT directly into SharePoint would be a nice follow-on.

Pushing data from the DT server all the way to the SharePoint RSS reader in real time, as well as feeding live DT data into Google spreadsheets and exploring mobile integration in the cloud, helped in putting our research in the proper perspective. These major successes and our other investigations provided much needed insight into the near future of cloud computing and how it will integrate into the NASA infrastructure and further NASA's mission.

In exploration of the integration of mobile applications to the cloud, a new generation Galaxy Nexus (Android V4.02 OS) Smartphone was utilized as a platform for DT to cloud connectivity experiments. The Smartphone included various sensors: accelerometer, gyroscope, orientation, magnetic field, pressure and GPS; of particular interest was the gyroscopic data. This data was stored locally on the Smartphone in a DT server, and then pushed live to a Google spreadsheet via a "dtGcalc" app. Data from the archive on the phone was also loaded into MATLAB for plotting.

# IT Labs Website



*Project Lead: Allison Wolff*

*Project Sponsor: Allison Wolff*

*Additional Contributor(s): Joel Abraham, Wei Wei Xu*

*Base Center(s): JSC*

In pursuit of a platform to support our program—IT Labs—we wanted to be able to not only support the processes by which our program operates, but also allowed for effective communication of all of the efforts going on inside of the program. We needed something quickly that could meet our needs, but also kept the overhead low.

To account for all of our requirements, we leveraged a technology that was already prevalent in the Agency—SharePoint 2010. As a program, we would be soliciting applications/proposals that would flow into a review process, and the technology had to support this as well. Most all these requirements were able to be satisfied within the website environment.

*Screenshot of IT Labs Website's Home Page*

One of the most interesting components about the website is the video component, and the way we integrated it into the website. It was interesting in that it was a threefold component: for one, it quickly related to a reviewer the highlights of the proposal in a short timeframe; two, it personalized the proposal, instead of just being words on paper or on a screen; and most importantly, it gave a voice to the proposal and its lead, allowing its vision to be fully communicated.

Though still in phase I, we are looking to make the interface slicker and add a section for proposals that were not able to be funded directly by the program, but still show a lot of promise—a.k.a. “Sponsorship Opportunities”. Also in the works is building in a dashboard to track cost, schedule and deliverables for all IT Labs projects (i.e., accountability mechanism). Finally, we also want to further innovative integration efforts, including: integrating a partner in innovation component for works across the Agency; working with JPL to integrate MAVIS (custom video search component) into the site, prototyping on our website; and partnering with Microsoft on ways we can improve our interface.



# Mobile Apps Acceleration



*Project Lead: Joe Estes*

*Project Sponsor: Tomas Soderstrom*

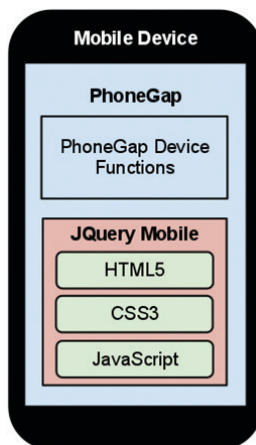
*Additional Contributor(s): Luke Dahl, Gabriel Rangel, Manson Yew*

*Base Center(s): JPL*

With the growing need for mobility across the NASA workforce, app development has become increasingly commonplace. Despite this growing need, a defined stance on how mobile apps should be developed and distributed at and among NASA Centers had not yet been defined.

In this project, we sought to analyze a set of solutions to this issue through the development of the prototype reference mobile application. From this, we wanted to establish a use case that showed best practices for developing mobile apps across the Agency. Developers at all Centers and among functional groups/project teams would have a reference tool to access when developing mobile applications for NASA. The benefits from this analysis would reduce errors and duplicate efforts, increase productivity and build user satisfaction.

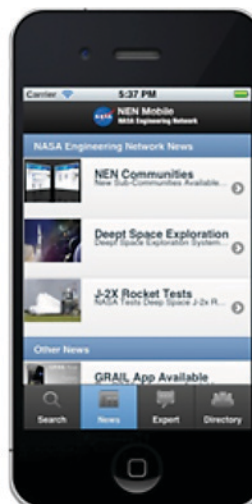
To facilitate the analysis of cross mobile platform development and distribution at NASA Centers, a “write once, run anywhere” stack of software was chosen. With the use of these complimentary technologies, a mobile cross platform version of the NASA Engineering Network app was developed and hosted on the NEN portal for user download.



Among the mobile software tested were JQuery Mobile and PhoneGap. JQuery Mobile is a unified, HTML5-based user interface system for all popular mobile device platforms, built on the rock-solid jquery and jquery UI foundation. Its lightweight code is built with progressive enhancement and has a flexible, easily theme-able design. PhoneGap is an HTML5 application platform that allows the user to author native applications with web technologies and gain access to native APIs and app stores. PhoneGap leverages web technologies developers already know best such as HTML, JavaScript and CSS.

From our analysis of mobile development using HTML5 and the “write once, run anywhere” stack of technologies, we concluded that HTML5 is in its ascendancy as a dominant mobile technology. The technologies that were chosen were not necessarily optimal, but using them was integral in our findings that HTML5 is a viable mobile technology. For apps that require heavy access to the device hardware, we recommended native development; for everything else, we recommended developing in HTML5.

We recommended proceeding to a cross-Center pilot for developing apps with the ability to write once and run anywhere. This will be accomplished by partnering with ACES (HP) and the Center for Internal Mobile Applications (CIMA) to provide a robust and secure mobile development architecture based on the findings of this analysis. HTML5 in a mobile context is mature enough to accomplish this. The apps landscape across NASA Centers will thrive because of this fact and would improve efforts in mobility.



# NetStack Prototype

*Project Lead: N/A*

*Project Sponsor: Ray O'Brien*

*Additional Contributor(s): David Swager, David Hartzell*

*Base Center(s): ARC*

NetStack is a set of network services and applications that are accessible inside and outside of the agency, with the primary intent of providing new and/or enhanced network services to agency users. An example of NetStack services would be network time protocol (NTP), and root-level DNS. These IP network services would be accessible via next-generation IP transport protocols, such as IP Anycast and IPv6, and would represent the first major services offered by NASA utilizing these protocols.

The NetStack concept would create a suite of network services utilizing low-cost Intel servers running Linux with minimal—but capable—network hardware. Ideally, the stack will be easy to replicate and be deployable to any NASA center wishing to host a stack.

The benefits of participation are lower-latency access to NTP and root-level DNS, and increased survivability against denial-of-service attacks due to the nature of Anycast.

Phase 1 of NetStack would provide Anycast NTP and DNS services to NASA and users outside of NASA (with rate-limits for protection). Included in this will be a public-facing web presence for these services, defining the parameters under which they operate, and guidance for their use.

Phase 2 would include PerfSonar functionality (Available: <http://www.perfsonar.net/>), which would facilitate user-driven performance testing and reporting for NASA networks, as well as regionalized security scanning tools for IT Security.

In addition to providing the network services described above, the development and deployment of the NetStack concept would itself require innovation and new thinking, outside of the normal network engineering boundaries, but at a high technology readiness level. NetStack is capable of supporting IPv4 unicast and multicast, IPv6 (with native multicast support) and IPv4/IPv6 unicast, all in a low-cost, open-source powered stack of Linux servers.

This project had a sound idea and far reaching capabilities, but unfortunately due to personnel issues—loss of the lead due to unforeseen circumstances on short notice—it was not able to realize its full potential. Nevertheless, plans are in effect in the near future to pick up where the project left off, fulfill the commitment to the project and the program and follow it through to completion.

# Network Mobility Testbed (Phase 1&2)

*Project Lead: N/A*

*Project Sponsor: Ray O'Brien*

*Additional Contributor(s): David Swager*

*Base Center(s): ARC*

The purpose of this project was to build out a lab environment that demonstrates mobility, automated workflows and auto-configuration for desktop workstations, while maintaining an equal or higher level of overall security through the use of automated client security profiling and remediation. The ultimate objective was development of a full solution, including a pilot, lessons learned and a whitepaper with specific recommendations for implementation. Due to limited funding, this project would initially build out a highly simplified environment that only included simplified workflows, client desktop auto-configuration through DHCP and MAC Address authentication.

Due to the organic growth of IT at NASA, every Center has different processes and procedures for providing basic computing resources such as desktop workstations with access to the network. It is also often the case that the workflows associated with this are labor intensive, including the need for technicians to do port activations, registrations, firewall rules, configuration of IP stacks, switch configuration, etc. This project's intention was to show that for a large majority of the basic computing resources at NASA, many of these processes can be automated with little cost or additional security risk.

For the purposes of the currently funded project, an initial, primarily web-based workflow was to be developed and demonstrated for requesting a device be added to the network, or moved from one physical location to another. This would include auto-provisioning of the network stack for a device via DHCP once the workflow is completed and the device is plugged in. A lab network environment would be created where this functionality could be demonstrated from two different subnets, including only allowing an authorized MAC address to connect.

This project had a sound idea and far reaching capabilities, but unfortunately due to personnel issues—loss of the project lead due to unforeseen circumstances on short notice—it was not able to realize its full potential. Nevertheless, plans are in effect in the near future to pick up where the project left off, fulfill the commitment to the project and the program and follow it through to completion.

# Peer Support for NASA IT Users



Project Lead: Jon Welch  
Project Sponsor: Ray O'Brien  
Additional Contributor(s): Saurabh Baveja,  
Estelle Dodson, Allison Wolff  
Base Center(s): ARC

*"The ability to perform R&D outside of the design constraints of NASA's core IT system implementation and maintenance groups can help spur unorthodox approaches. It is important for NASA to do this as an input to our long-term IT architecture planning process."*

Jon Welch, Project Lead

Like the staff of any other large organization, NASA co-workers share a great deal of IT support information informally; advice on the best software to use for a specific analysis problem, a quick question about configuring an iPhone for email access or the options available for remotely accessing data from home. This is done because users sometime want quick answers to simple questions, they are trying to do something that is outside of officially supported IT services or they have encountered a thorny problem that is being bounced back and forth between different technical groups.

Since most of these conversations happen informally, the "reach" of any one person is limited to their direct peers; but with the use of peer support tools—purpose-built web and mobile applications, with the appropriate use policies and manager support—there is a much better chance of sparking a synergistic conversation that engages a larger group of users. In addition, because these conversations are classified and stored by the peer support system, they are available to all as a growing "corporate knowledge resource".

Other large commercial and academic organizations have used these techniques to capture knowledge on resolving IT issues and on innovative new IT solutions. Our team believed that the potential of these strategies for NASA's workforce warranted a careful exploration of peer support strategies.

In respect to this belief, the aim of our project was to evaluate the feasibility of using peer support approaches to enhance the effectiveness of NASA's existing IT support resources, such as help desks and knowledge bases.

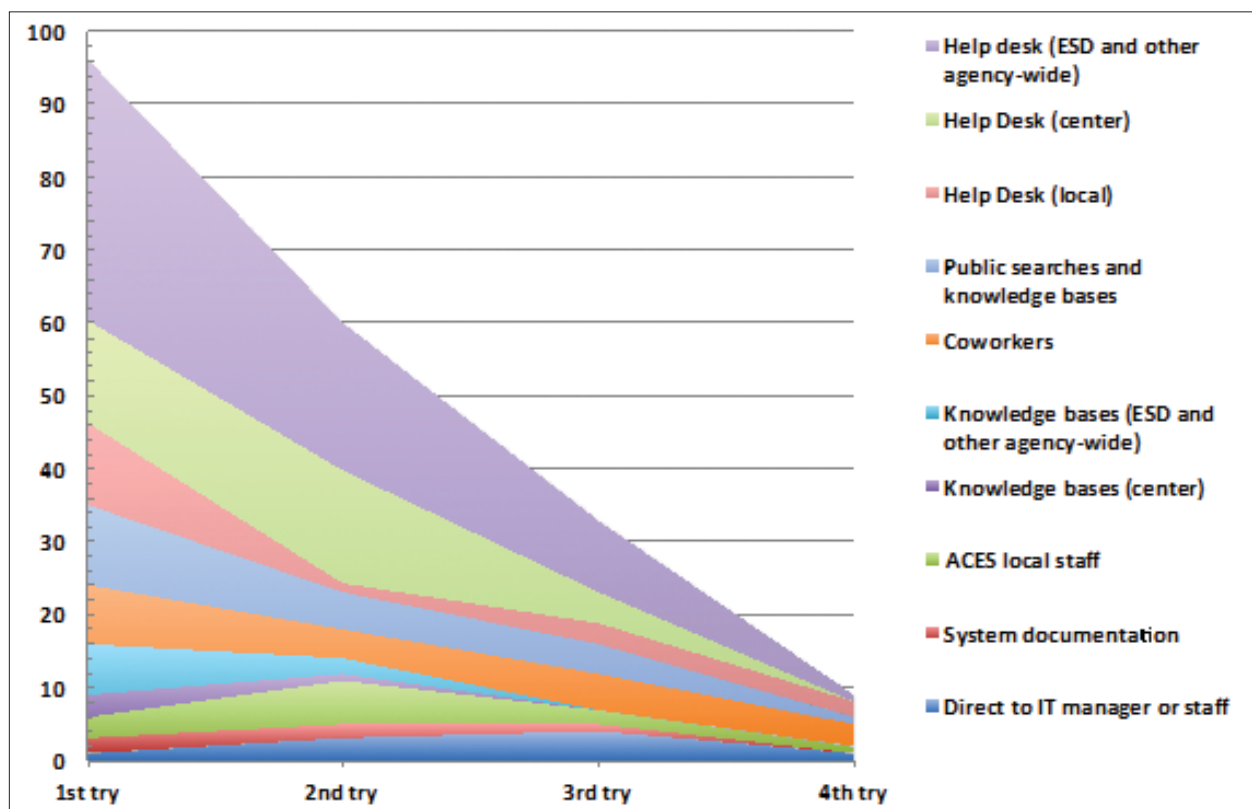
Our research efforts focused on the following four major questions:

- What is "peer support", and what are the potential benefits and risks?
- What factors determine the success or failure of peer support systems?
- How suitable are peer support systems for NASA's user groups?
- What specific features are recommended for peer support approaches within NASA?

Our discussion was based on existing academic studies into peer support systems, case studies from organizations using peer support techniques, interviews with NASA knowledge workers and user surveys.

As part of our research efforts, we conducted a NASA IT Support Utilization survey in July 2012. The survey asked questions about the resources used to resolve recent IT issues, and the effectiveness of those resources. A total of 102 responses were received and analyzed by our team.

One question asked in the survey was: In order of use, what support resources (both NASA and non-NASA) did you use to resolve your most recent IT issue? Results from this question are shown in the stacked area chart provided below; this chart shows the number of respondents that used the IT support resources listed in the legend during their first, second, third and fourth attempt to resolve an IT issue.



*Respondent's Use of IT Support Resources (1st – 4th Attempt)*

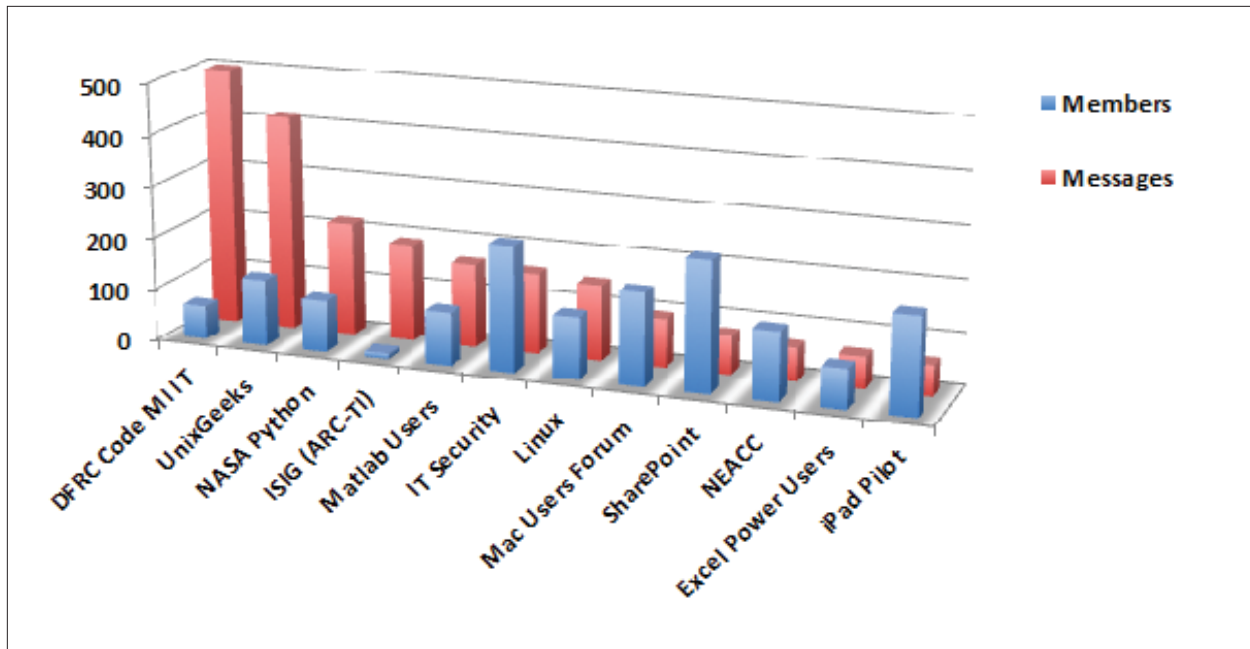
An interesting trend is apparent: for issues that required three and four attempts to resolve, resources accessed through existing work relationships (e.g., coworkers and local IT staff or managers) became proportionately more important.

Along with the survey, we assessed current peer support activities at NASA; one of these was Yammer—a “corporate social network” service. Participation levels from this service, as well as others, demonstrate that NASA users are open to peer support activities, and have employed a variety of channels to create communities for sharing technical information.

Other peer support activities at NASA include: C3, NASA Engineering Network, ExplorNet, Apps@NASA, and SharePoint. All of these are used in varying degrees at the Center and Agency levels to encourage peer support and collaboration.

In reference to our fourth question on specific features recommended for peer support approaches, we identified two very important factors: one, selecting the right NASA IT user groups for peer support; and two, selecting the correct software features needed for NASA peer support communities.

## Peer Support for NASA IT Users ...continued



NASA Yammer Participation Levels—IT Related (chart truncated for display)

User groups that employ peer support approaches need to be large enough to contain knowledge contributors for most issues, but still strongly committed to each other through organizational ties or existing academic or personal relationships. They should also have substantial overlap in IT tool use, be underserved in some aspect of IT support, be open to using the new systems that create a peer support community, and have management support and adequate time and energy for knowledge contributions.

Software features that are important to peer communities within NASA include: community content submission filtering, automated content clustering by topic, full text search, email integration and NASA security and policy compatibility.

Our white paper provided information on peer support terms and system designs, previous work in this area of research and the potential for peer support within NASA's specific IT support environment.

In order to conduct a real-world test of our research findings, we have plans to build a twophase prototype peer support system. In the first phase of this prototype, we would perform an evaluation of relevant peer support systems on the market and compare those with the existing peer support resources that NASA is currently utilizing (Yammer, SharePoint etc.), then make a recommendation on a specific software package or system. Should that recommendation be approved, we would then move into the second phase wherein we would set up a prototype of the approved system, recruit users, moderate the user community, define success metrics and report the prototype system outcomes.



# Study Use of Computer Tablets (Collaborative Drawing)



Project Lead: Estelle Dodson (ARC)  
Project Sponsor: Ray O'Brien (ARC),  
Ben Bryant (KSC),  
Edward McLarney (LaRC)  
Additional Contributor(s):  
Deveney Lonergan-Stenger (KSC)  
Frances DeMarco (LaRC)  
Base Center(s): ARC, KSC, LaRC

*"Often the people with the best understanding of the technical needs are operational, not higher level management; IT Labs is valuable because it allows people with hands on experience—the subject matter experts—to actualize their ideas. Small, iterative projects are good ways to 'learn' things and figure out ways to do them better. If we try to come up with an Agency-wide solution from the beginning, we won't get far. By focusing on a small-scale solution instead, then expanding to a Center level, and eventually to the Agency through an iterative process, the potential for positive change and improvements are increased."*

Estelle Dodson, Project Lead

Our project's purpose was to evaluate the effectiveness of using computer tablets to provide an alternate means to conduct presentations, training, and meetings while reducing costs, enhancing collaboration and improving sustainability. One goal was to determine the effectiveness of the capabilities before we invested too far; the other was to enhance the way we work in order to enable the NASA mission.



Live Use @ ARC

## Study Use of Computer Tablets (Collaborative Drawing) ...continued

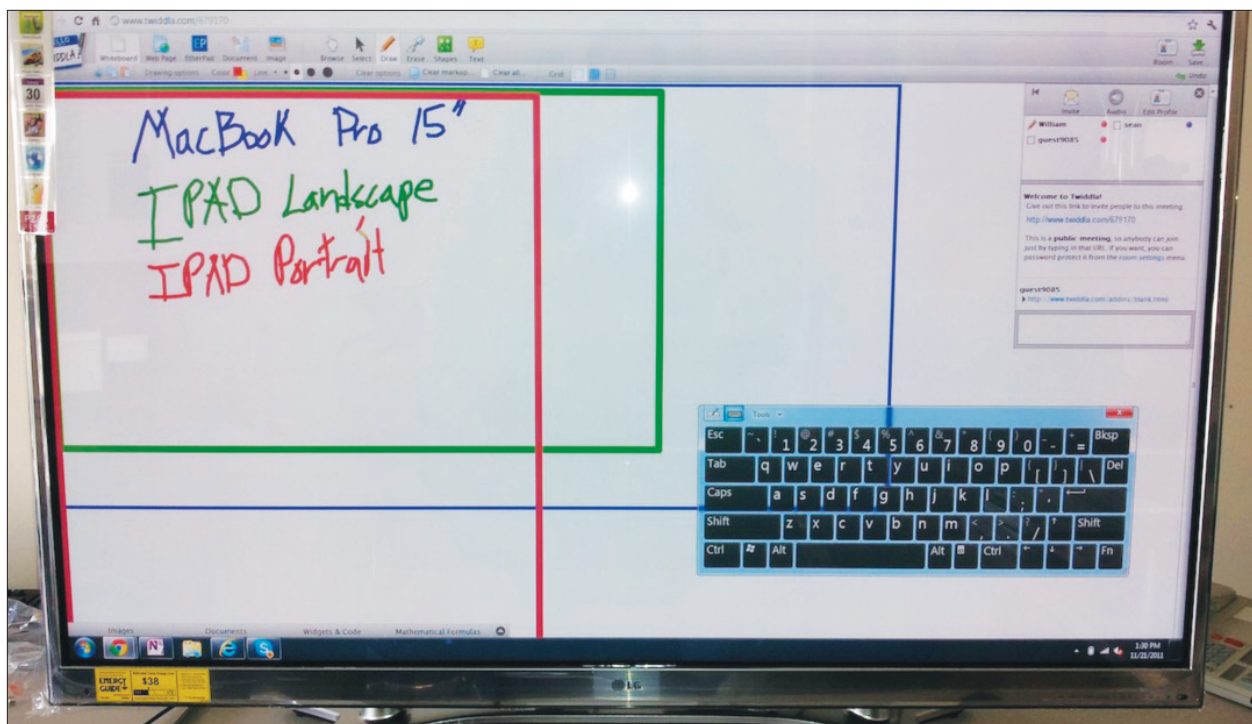
The ability to create arbitrary diagrams is critical for creativity, conceptual development and communication. Enabling this over great distances for high fidelity, two-way participation has proved historically difficult and/or expensive. Evaluating new and low-cost approaches to this problem would provide a new capability. The evaluation proceeded with a plan that defined the experience to be emulated remotely and included evaluations of such approaches and technologies as large display environments, pen and touch displays, etc. Criteria for evaluation included, among others, viability of the concept, sensitivity of various devices and evaluation of the impact of multiple local and remote participants.

Originally, ARC, KSC and LaRC conducted this study via independent, yet coordinated projects and submitted separate proposals; however, IT Labs determined that the similarities warranted a collaborative effort—with each Center identifying specific focus areas for their contributions.

ARC's contribution was to evaluate various commercial and readily available shared white boarding environments and demonstrate shared white board environments. Our contribution would also provide a proposal for additional NASA use cases that can be used to evaluate the usefulness of Virtual Networking technology as well as the final presentation to be delivered to IT Labs and management.

KSC's contribution was to: evaluate the intuitiveness and effectiveness of using a tablet device to distribute presentations to meeting attendees on other tablets to prevent printing of handouts; use tablet device for meeting rosters, meeting notes and whiteboards; and develop a survey and method to evaluate the usability of the apps, tablets and environment.

LaRC's contribution was to evaluate the effectiveness of using computer tablets to provide an alternate means to conduct presentations, training and meetings while reducing costs and enhancing collaboration. The overall objective was to test the use of tablets in the delivery of training as well as to provide an additional alternative to WebEx or VITS capabilities for meetings and collaboration. Assessment reports were also provided during the study.



Visual Exemplifying Resolution

# Transition to Digital Publishing



*Project Lead: Lawrence Merrill*

*Project Sponsor: Edward McLarney*

*Additional Contributor(s):*

*LaRC Media Solutions Branch (Graphics Section)*

*Base Center(s): LaRC*

*"It was a pleasure participating in the IT Labs process. I appreciated the freedom allowed without constant calls for reporting metrics; this allowed me to collaborate more with my team and focus on successfully completing the project."*

*Lawrence Merrill, Project Lead*

The graphic designers in LaRC's Media Solutions Branch (MSB) have worked digitally for nearly two decades, but their output has mainly been traditional print. As the tablet/mobile device market matures, there is a growing need to produce designs in digital format. Along with this growing market, strong Federal policies have been announced to reduce the amount of print materials produced; as such, it is clearly essential to make efforts to move into the digital publishing arena.

Moving into this arena though, brings up certain questions. What does moving into this new arena entail? How does the digital publishing workflow differ from traditional print production? What devices are out there and which ones are customers are using? How do we publish to each of them in the most efficient manner?

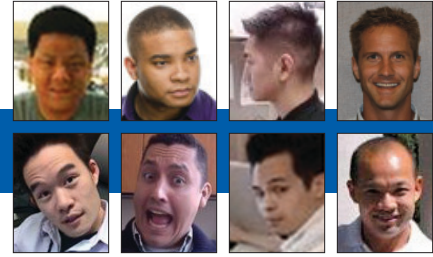
When the last round of print-reduction strategies were explained, the MSB decided to delve into the possibilities of developing interactive books; however, with digital publishing there were many elements to consider. NASA publications have always had strict guidelines/policies to follow; the same goes for NASA websites. Since e-publishing is pretty much a hybrid of the two, elements such as 508 compliancy—which was not an issue with printed materials—is now.

So far in our digital exploration, the iPad is the device of choice, thanks to the elegance of the OS overall and the capabilities of the free authoring tools and interactivity. The Android-based systems are better than expected, but not nearly as polished in the UI as the Apple devices.

And speaking of Apple, one of our biggest successes has been using Apple's iBook Author—a four page interactive fact sheet was successfully created for MLAS and included a video, a 360 degree, 3D model and a photo gallery. This has actually been shown to a customer and they are now requesting an interactive e-book publication.

Designers accustomed to traditional layout and design are learning to change their planning thanks to the many options available in an e-publication. Single images can be videos, galleries or even 3D models. Text reflows depending on user-selectable size and screen orientation—a lot different from static 2D book pages.

Discoveries made during our investigation of state-of-the-art digital publishing will help LaRC and NASA grow in the right direction. Our customers will gain easier access to our outreach materials. The obvious advantage of interactive publications will engage a larger audience.



# Video Search

*Project Lead: Ricky Ma*

*Project Sponsor: Tomas Soderstrom*

*Additional Contributor(s): Brandon Buie, Evan Chan, Luke Dahl, Jeff Liu, Gabriel Rangel, Wayne Wong, Manson Yew*  
*Base Center(s): JPL*

Technology trends have shown an explosion of multimedia content on the Internet and in our organizations. Video and audio media have now become first class content. It is one of the easiest ways to capture, retain and share information. Current multimedia search functions only provide searches around the metadata manually added to a file, which is a very limited method of searching for content and is wholly dependent upon the submitter of the audio or video file to populate keywords.

Crowdsourcing of keywords—allowing others to tag content with additional keywords—has proven to improve the ability to find content; however, it is still prohibitive as it requires others to take action as well, and is limited to what submitters feel are appropriate or relevant keywords. The underlying problem has been that it is difficult to accurately transcribe spoken words to a text file that may be indexed.

Our project's mission was to determine if video search is possible with current technology and if it could bring value to the NASA community. It was initially funded to provide a prototype and a white paper with the lessons learned. During the case study, the team researched different vendors and technologies to see who could help return the most from the initial investment and help bring a usable prototype for the CTO community to test.



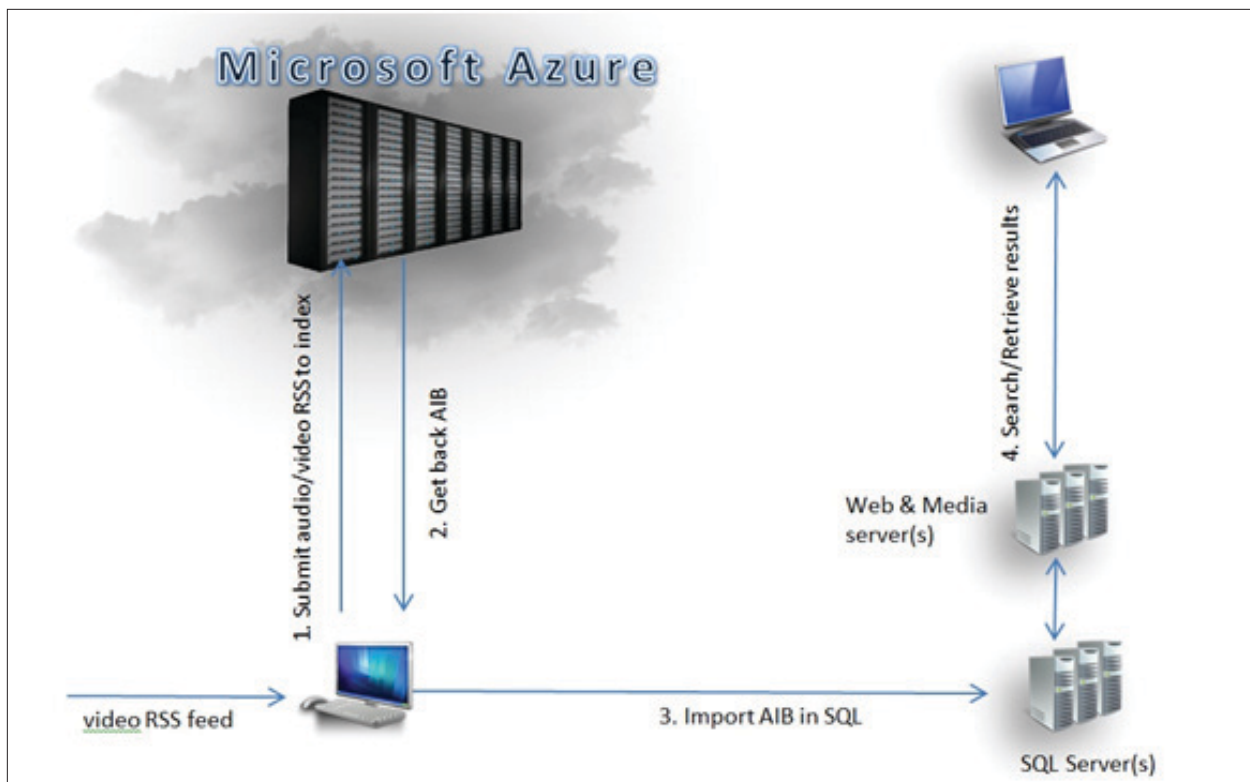
*Screenshot of Prototype System with 2011 NASA IT Summit Content*



One of our main goals with selecting a technology and proceeding with the case study was to minimize development costs and meet our goals. During the evaluation process we took a look at multiple vendors ranging from Nuance, Google and others. Overall technology, cost and speed became major factors in our selection process.

The partner eventually selected for the prototype was Microsoft. Microsoft Research has recently created a new audio indexing technology called MAVIS—Microsoft Research Audio Video Indexing System. MAVIS was selected as the overall technology choice because of its advanced refinement and accuracy in long audio indexing. It provides a platform that can automatically index through spoken text and create a way for systems to search through the spoken text in multimedia files. Partnering with Microsoft Research—along with rapid application development and existing video expertise—helped to speed through the production and delivery of a working prototype.

We are pleased to report that current technology supports the ability to translate spoken word into a usable file that may be indexed and leveraged for searching multimedia files. After meeting with NASA stakeholders, we also determined that this type of functionality would be very valuable to our organizations. In addition, this technology also allows us to provide autogenerated closed captioning, and our NASA stakeholders have identified captioning as a critical success factor. On the technology side, MAVIS has met most of our needs, but our prototype needs additional work to further address nuances of serving video search within the NASA environment and security constraints before becoming a production system. We believe that the prototype should be progressed further into a pilot and we should add additional technical videos from the NASA engineering community and open the pilot to that community.



*High-Level Overview of the MAVIS Indexing Process*

# Virtual Networking



*Project Lead: Bobby Cates  
Project Sponsor: Ray O'Brien  
Additional Contributor(s): N/A  
Base Center(s): ARC*

*"IT Labs is a platform or podium to let the NASA CTO community know what's real, what's hype and what's long term; it brings the community up to speed and makes them aware of what 'state of the art' technology is being used currently and will be used in the near future. It has also allowed me to have a 'voice'.*

*IT Labs provides you with funding that could not be found elsewhere; my project would certainly not have progressed—instead, remaining strictly academic. The program really provides a means to an end that otherwise does not currently exist."*

*Bobby Cates, Project Lead*

Existing hardware-based approaches to routing and switching are not suitable for the dynamic environments enabled by virtualization and cloud technologies. My project's intention was to demonstrate the use of virtual networking capabilities using OpenFlow-based software defined routing technologies as an alternative to proprietary hardware-based solutions. The demonstration was conducted using a multimode wide area network (WAN) interconnected with software defined tools and utilities instead of conventional routing hardware appliances.

It demonstrated an alternative WAN transport technology to accommodate large amounts of data transfer between clusters of machines without dedicated routed network infrastructure. In the future, such technology will be key to implementing responsive networking connections between private cloud resources that may be deployed at NASA Centers and ensuring consistent and reliable NASA connections to public cloud resources (e.g., Google, AWS, etc.).

I was very pleased with the funding my project was granted as it allowed me to place real hardware on a real network and run the hardware to real servers, instead of just conceptually mapping out this process in a white paper. My successes in performing this live testing has even influenced the development community that is making these standards/protocols in networking. This influence is encouraging since the bigger picture is eventual Agency-wide adaptation, though the initial scope was data-Center specific.

Virtual networking (or software-based networking) will be key to enabling cloud-based Networking-as-a-Service, allowing the network requirements (e.g., performance, capacity, reliability, security, etc) of an application to be met through direct configuration by the application implementer at time of deployment and easily changed as needs dictate. Step by step we are slowly reaching towards a technical utopian idea of "any device, any network, anywhere".



# Web Analytics Prototype

Project Lead: Thomas Beaman  
Project Sponsor: Ray O'Brien  
Additional Contributor(s): N/A  
Base Center(s): ARC

*"This program provided an opportunity to pursue an idea that I normally wouldn't have had otherwise or would have been able to get off the ground. I believe it also provides an outlet for getting ideas out there."*

Thomas Beaman, Project Lead

Without an analytical tool, it is hard to guess which websites are in use and which ones are not. As popular as Google applications are within the Agency, Google Analytics is not approved for Agency use due to security of information.

In its stead, I proposed the use of Piwik—an open-source alternative to Google Analytics which would allow the running of a NASA instance that provided greater control over data, thereby minimizing NASA's data leaking outside of the Agency's network. My purpose of using this technology was to garner greater insight into how our websites were being used—or not used in some cases.


Changing technology makes any existing tool outdated very fast, and a web analytical tool helps with making decisions on how a tool can be improved. It is important to understand what gets attentions from people, so that similar work can be accomplished. Without an analytical tool, it is almost impossible to make decisions on improvements.

Information gathered from this technology included: hits per day, on specific days and specific times; browser types, features and plug-ins; device types, including operating systems; which pages were being viewed/not viewed; and even which page features were being used (on certain sites).

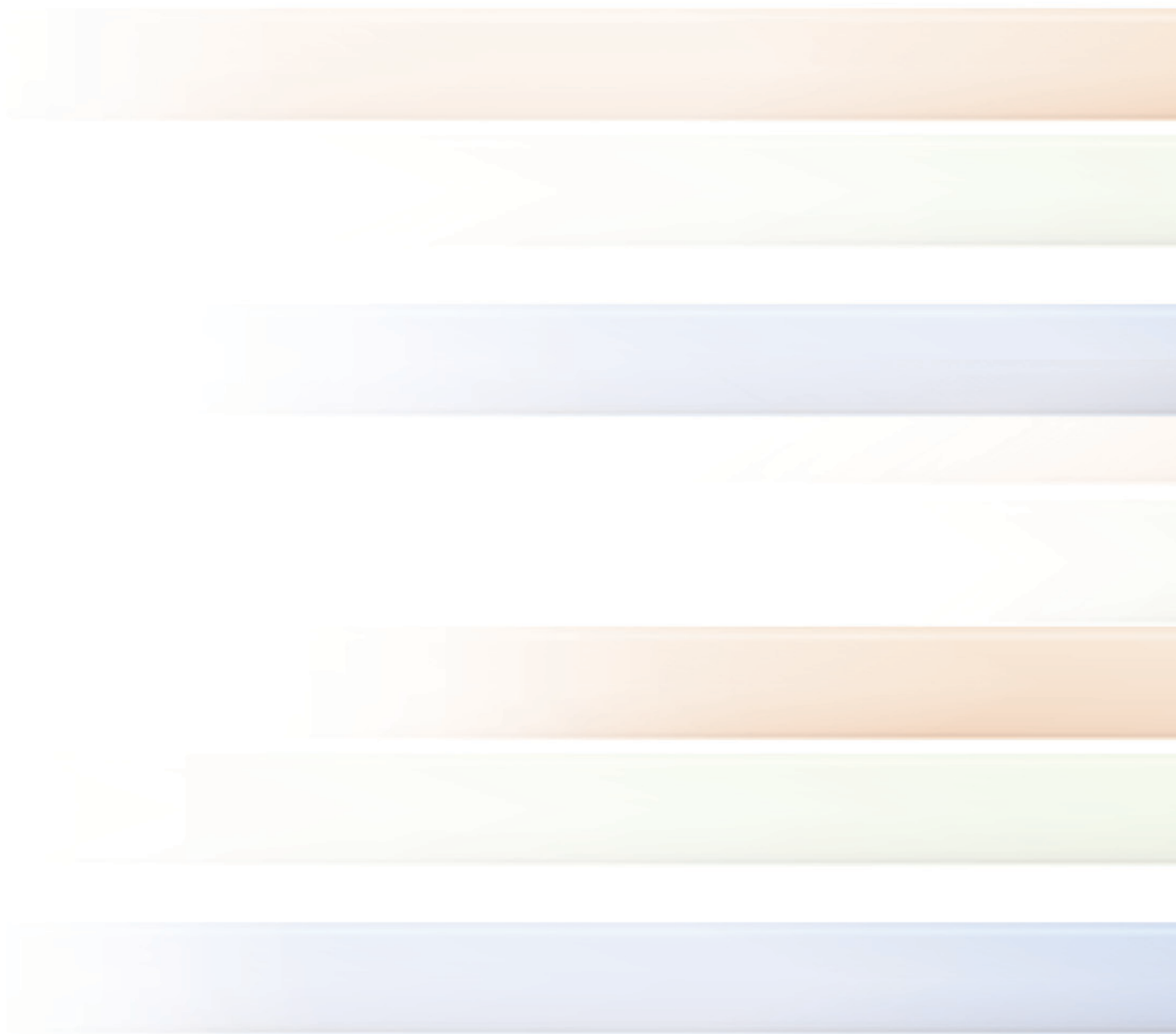
One of my discoveries while exploring this technology was that it has the potential to be used as a SaaS, since its permission system allows use of the same Piwik install to support many users and websites. It is also highly flexible and customizable in showing the information you want to see at a glance. Statistics can even be emailed or exported into Excel and PDF formats, and the report shows the unique links clicked from the InsideAmes website.

The Piwik prototype is currently installed on a single web server and should its use grow dramatically some additional work would be required to allow it to scale and handle the increased load. My eventual ideal scenario would have this applied Agency-wide, but as I stated, scale issues would have to be worked out and it would need to be implemented across several stages/phases (e.g., amount of servers, loads, etc.).

I recommend Piwik as one of the best web analytics choices since data is stored locally—satisfying NASA's security requirements—and is simple to bolt onto existing applications.



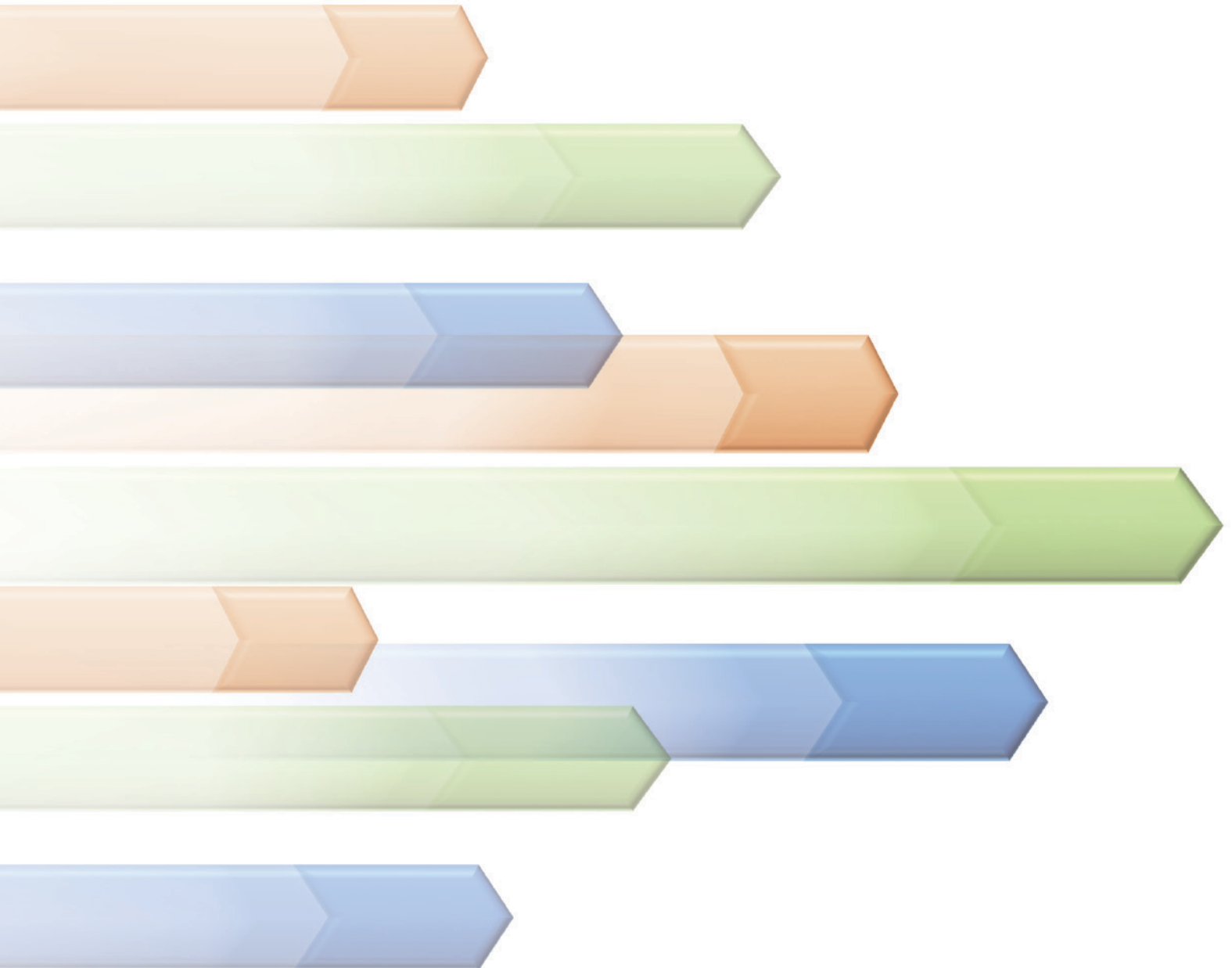
Clicked URL	Unique Clicks	Clicks
webdir.nasa.gov	1705	1996
amesexchange.arc.nasa.gov	1167	1216
share.nasa.gov	1076	1344
phonebook.arc.nasa.gov	789	914
saturn.nasa.gov	544	740
webmail.nasa.gov	417	516
idmax.nasa.gov	372	459
iemp.arc.nasa.gov	309	357
centerwide.arc.nasa.gov	295	326
hr.nasa.gov	284	322
www.nasa.gov	190	203
server-mpo.arc.nasa.gov	131	155
q.arc.nasa.gov	127	160



## Upcoming Projects

*With the successful run of projects that IT Labs experienced previously, the program sent out another call this year to garner ideas, proofs-of-concept, prototypes and pilots.*

*The following pages detail the awarded projects and a small synopsis of what each project intends to accomplish.*



# Baselining NASA's Mobile Device Theft and Recovery Processes

*Project Lead: Irene Wirkus*

*Project Sponsor: Anthony Facca*

*Base Center(s): GRC*

This is a collaborative effort between the Agency's IT Security community, the IT Security Awareness and Training Center (ITSATC) and NASA's Emerging Technology and Desktop Standards (ETADS) program that attempts to identify measurable gaps and deficiencies in NASA's IT Security training efforts, augment IT Security's mobile forensics capabilities and demonstrate the efficacy and value of Enterprise mobile device management.

Our project has three primary objectives: first, to support NASA's IT Security Awareness and Training Center (ITSATC) by establishing a mobile data and device baseline and identifying possible programmatic gaps and deficiencies; second, to advance and refine NASA's mobile forensic analysis capabilities resulting in guidelines and lessons learned to the IT Security community; and finally, to demonstrate and qualify the power, efficacy and value inherent to mobile device management solutions.

# Benchmarking Virtual Collaboration Technologies Across Government Agencies

*Project Lead: Mary Walsh*

*Project Sponsor: Ray Gilstrap*

*Base Center(s): ARC*

NASA is facing great constraints in its ability to hold conferences and fund travelling for staff because of new federal guidelines. While some pockets in NASA, such as the NASA Astrobiology Institute (NAI), have been using virtual tools that go far beyond normal videoconferencing rooms and slide shows, their use is not widespread within the Agency.

My project proposes a quick, cheap benchmarking study to identify virtual collaboration in use or planned at the other eleven federal R&D agencies. Results will help our Agency continue necessary mission-enabling meetings in more affordable ways, and would support the IRM Strategic Objectives 1.5 and 3.2.

The benchmarking study would compare the virtual collaborative technologies in use or planned by: DoE, ONR, NIST, USGS, NSF, NOAA, DHSR, USDA, FCC, PTO and NIH. We would create an interview instrument; call or visit the agencies to interview IT staff; analyze the interview results and write the technical position paper. This delivered paper would highlight those Agencies' best practices and lessons learned in collaborative technologies that might meet NASA's needs. This benchmarking survey is an important first step in developing technologies that would speed NASA mission success.

# Communications Dashboard

*Project Lead: David Scott*

*Project Sponsor: Burton Bright*

*Base Center(s): MSFC*

While gathering software requirements for web-based applications to be used in ISS flight control operations, it was noted that a lot of text and attachments are replicated among several systems and that much voice traffic involves coordination of sending and receiving legacy type communications. It was also noted that Facebook and other SNS do a very good job of integrating information and processes relevant to their intended audiences and purposes. The idea arose that perhaps a similar—though certainly not identical—approach could gather information and processes relevant to real time control.

My project will build a software test bed to explore unconventional integration, presentation and exchange of flight control communications in intra-Center and/or inter-Center contexts. The ultimate goal is to create a unified interface for multiple communication tools to complement and/or augment voice loop discussions. This would enable flight controllers to manage more operations with fewer spoken and written words and with greatly reduced stress.

Some totally new methods and/or unique mash-ups of existing techniques may emerge from the research. Techniques developed could apply to a wide variety of real time control environments, such as aircraft flight control, factory operations, military operations, 911 call centers and inter-Agency responses to large-scale disasters. The same methods could also be applied to a wide variety of less stressful environments that still involve a lot of information juggling, such as large scale design projects and maybe even source evaluation boards.

# DropBox for the Enterprise: Secure Collaboration for Mobile Workers

*Project Lead: Gabriel Rangel*

*Project Sponsor: Tomas Soderstrom*

*Additional Contributor(s): Matt Derenski, Ricky Ma, Khawaja Shams, Manson Yew*

*Base Center(s): JPL*

A growing part of the NASA workforce is mobile, and often this mobile workforce plays key roles in various team collaboration activities. However, existing tools used for mobile collaboration are fractured such that more often than not mobile workers resort to email. Not only is email a poor collaboration environment, but it exposes the worker and NASA to privacy and security issues, configuration management issues and a variety of organization and usability issues that limit the productivity of these important members of the NASA workforce.

In the previous IT Labs project, exploring issues and ideas related to Drag-Drop-Sync-Share (DDSS) tools such as DropBox, we uncovered the growing limitations on mobile collaboration. However, we also found elegant consumer-driver solutions for supporting mobile collaboration. Not only are there well designed IT applications for secure collaboration, but these same applications also include other such valuable services as backup and personal cloud for general users.

This task is the follow on to DDSS; it takes the capabilities explored previously and provides a proof-of-concept for secure collaboration for mobile workers. In addition, this prototype will also explore the applicability for ancillary services and how they may support the overall architecture for mobile tools for NASA.

# Engineering Enterprise Data Harvest Standards

*Project Lead: Chatwin Lansdowne*  
*Project Sponsor: James McClellan*  
*Base Center(s): JSC*

Last year I was awarded an IT Labs study to investigate the possibility of deriving Automatic Test Markup Language (ATML) documents from a SysML model (see the ATML & SysML project described in the Recent Projects section of this report). SysML is a tool used by the ModelBased Systems Engineering grass-roots initiative. The study conclusions are being published at the IEEE AutoTestCon 2012.

I have continued to explore the ATML information framework this year. In April, I hosted the IEEE Standards Coordinating Committee-20 meeting at JSC where I provided tours of NASA use cases (including iPAS and TS-21) and provided a pitch from Dr. Paul Keller (ARC) on the NASA Information Architecture and our desire for interoperable data format standards. Despite interest in Engineering (iPAS) and Mission Operations (TS-21), neither organization has wanted to fund external standards development or even formulate our interface definition for internal exchanges.

My driving purpose is to reduce the cost and schedule of the engineering cycle for flight projects. I propose to do this by using industry standards to enable automated data harvest into interoperable formats. I believe that the standard interface IEEE agreed to open will enable software to discover system elements, discover their configurable parameters, the constraints on those parameters, how to interpret indicators and measurements and ultimately discover how behaviorally to use the elements.

# Enhance NASA's Large File Transfer Capability to 100GB Capacity

*Project Lead: Bryan Walls*  
*Project Sponsor: Burton Bright*  
*Base Center(s): MSFC*

The current NASA Large File Transfer (LFT) system supports files up to 10GB in size. The Digital TV program has a dedicated file transfer capability for moving large video files up to 100GB in size. Other programs also have requirements for file transfer above the current 10GB limit.

My proposal suggests enhancing or replacing the existing LFT to support the larger requirements as a shared NASA resource, rather than supporting multiple file transfer implementations on a program by program basis.

The purpose of the first phase of my proposal is to demonstrate the required functionality of primary vendor offerings in the NASA environment to enable a product choice for further phases. Three vendors will be considered and compared for functionality, cost and performance in the NASA environment. The three candidate systems are product suites by Accellion, the incumbent for the current LFT system; Aspera, the leader in file transfer in the video arena; and Signiant, a competitor in the same arena. A fourth product—EMC's Syncplicity—will also be evaluated, if possible.

The objective is to compare the vendor offerings using computers in the NASA environment, simulating network and environment for systems located at one of the major field Centers and Headquarters, for transferring files in the 10GB to 100GB size range. The end of the initial proof-of-concept phase would pick one vendor suite to implement as a prototype with hosting targeted for deployment at Headquarters and at least one Center, with an implementation plan.



# Evaluation of PIV Two-Factor Authentication with iPads

*Project Lead: Irene Wirkus*

*Project Sponsor: Anthony Facca*

*Base Center(s): GRC*

NASA's adoption of a work from anywhere model presents unique challenges for users needing to access applications requiring PIV/Smartcard authentication. One of the specific challenges is enabling users to work from the end user computing devices of their choice. At this time, the requirement for PIV authentication limits device options to traditional desktop computers and laptops and is an impediment to the work from anywhere initiative.

The use of iOS devices within the Agency increases every day and their continued use is key to the success of NASA's overall mobility strategy. Users of iOS devices do not currently have the ability to access applications requiring PIV authentication. One of the possible solutions for enabling this capability within NASA is the use of an iOS Smartcard reader and supporting browser application. Implementing this type of solution would allow users to access applications requiring PIV authentication. Additionally, PIV authentication can provide a simpler method of authentication than the complex passwords required by LaunchPad.

My proposal seeks to evaluate the feasibility of using the Thursby PKard reader and associated PKard reader application in the NASA environment for access to applications requiring PIV authentication. The purpose of this prototype is to demonstrate the feasibility of using a Smartcard reader on an iOS device. Specific objectives include: evaluating product capabilities, evaluating product ease of use and developing recommendations.

# Lightweight Digital Signatures

*Project Lead: Manson Yew*

*Project Sponsor: Tomas Soderstrom*

*Base Center(s): JPL*

Many forms across NASA still request ink signatures; however, unless there is a legal requirement for a notarized signature, such signatures are unnecessary. Furthermore, such signatures can be costly and time consuming, especially at Centers that are broadly distributed (e.g., KSC). Often the signature is merely a low risk acknowledgement that people in the chain of command have read and concur with the form.

Digital signature can address this issue. Whether with email plug-in, PDF plug-in or native Microsoft Word functionality, forms can be transmitted electronically and signed. Previously, NASA has employed a workflow-based form system that it has since abandoned, mostly because of usability and maintenance issues. As the environment has matured, we propose to analyze the state of the industry, including assessing the capabilities NASA may already have on hand that could provide lightweight digital ID for forms, such that forms could be signed and stored electronically.

Our proposed technical position paper would analyze the NASA environment and summarize the barriers to digital signatures. It will also analyze the current marketplace as well as NASA's current inventory that may provide a simple jumping-off point for e-signatures. In addition, it may also address the history behind certain one-off solutions to digital signatures, such as timecards, to gather lessons learned. Lastly, part of the analysis would be to see if there may be benefit to NASA to have tiered digital signatures, and to implement lightweight digital signatures that could result in great cost savings across the Agency.

# Safeguarding NASA's Mobile Assets

*Project Lead: Irene Wirkus*

*Project Sponsor: Anthony Facca*

*Base Center(s): GRC*

As NASA's workforce becomes increasingly mobile, the need to shield it from modern day threats becomes of paramount concern. While once adequate, NASA's historical practice of relying on policy and process (e.g., C-Forms 702, 892, 9916, physical security checkpoints, etc.) does little to protect intellectual property or Agency assets exiting NASA's secured infrastructure.

While the Agency has taken steps via its DAR initiative, gaps remain. These gaps include extending the protective footprint in a manner that deters theft by securing not just the local hard disk, but the entire PC. Also absent are protective services that trigger additional layers of security, such as system disablement in the event policy or threshold conditions are met. Also missing is the ability to remotely disable (or "kill"), or return to service a missing, lost or stolen system.

Our proposal describes a potential collaborative effort among the Agency's IT Security community, NASA's Emerging Technology and Desktop Standards (ETADS) program and Intel to study the efficacy, viability and Enterprise requirements needed to support Intel's Anti-Theft technology. This technology is inherent to Intel's processor architecture and has the potential to augment NASA's Data at Rest (DAR) initiative and extend protection services to the entire PC rather than just the local hard disk.

# Security for Mobile Mission Applications

*Project Lead: Andrew Cecil*

*Project Sponsor: Burton Bright*

*Base Center(s): MSFC*

Ubiquitous mission operations are quickly approaching. The Space Launch System (SLS) engineering teams are looking for applications to monitor 24-hour tests. Both the SLS and International Space Station (ISS) programs personnel are looking to have the ability to support from their desk, at home or even at the ballpark.

Often the testing and operations for space missions require many hours to days of setup and execution. It is anticipated that less personnel will be needed onsite and can be available on-call with mobile applications to monitor data by exception notifications, phone calls, text messages or email. Mobile applications provide unique methods to bring operators, subject matter experts and engineers together quickly for troubleshooting.

However, to send data to mobile devices, security needs to be evaluated. The system needs to be able to authenticate the user and then verify and validate the information being transmitted. Our proposal plans to evaluate NIST security controls applicability and achievability to mobile applications.

Our goal is to produce a strawman security control configuration to understand how NIST controls can be applied to mobile applications and devices, both managed and unmanaged. By exploring the aspects of security in the beginning of the application development, we are ensuring that security is applied during the entire lifecycle of the applications. It also begins to provide a template of sorts that can be used to enhance future applications.

As another part of this activity, we will be evaluating the Center for Internal Mobile Applications (CIMA) framework to determine its applicability to mission environments. This will review the question: Can the Enterprise solution support mission environments, and if so, how would this look?

# sysadmin.nasa.gov – Knowledge Sharing for Improved Operations

*Project Lead: Eric Everton*

*Project Sponsor: Edward McLarney*

*Base Center(s): LaRC*

In the day-to-day operations of maintaining diverse and dependent systems, as well as the expanding base of technology, there are a plethora of methods and solutions concerning information that are generally committed to memory, various local file repositories or ticketing systems. Because of limited contact within the community, this information is either stovepiped or passed down from senior SAs to junior SAs, shared among known colleagues or lost through attrition. This means that many administrators are addressing the same or similar issues, repeating work, and as a community, hemorrhaging knowledge.

Our proposal is a grassroots endeavor developed by a large group of system administrators and IT security professionals around the Agency, for the internal hosting of a community-supported centralized set of services. These services will be made available to all NASA system administrators, and this community in turn would help to organize information, enhance crossAgency communications and improve operations.

The host would, at a minimum, provide a code repository using subversion, which could host a common body of tools developed and used by NASA administrators. It would also provide a website hosting knowledge sharing tools, using Trac as the content management system. The service would be managed and maintained using NASA central authorization services such as NDC or IDMax, and a volunteer team of system administrators from across the Agency, with members from IT security and oversight from a NASA POC.

## Videoconference E-Concierge (V-Concierge)

*Project Lead: Manson Yew*

*Project Sponsor: Tomas Soderstrom*

*Additional Contributor(s): Gabriel Rangel, Steve Sawyer*

*Base Center(s): JPL*

NASA has made many investments in its teleconferencing and videoconferencing capabilities. However for a variety of reasons, NASA's videoconferencing capabilities are underutilized, especially by the cross-Agency program and project personnel that videoconferencing was designed to enable. With the current budget pressures on travel, videoconferencing at NASA has never been more critical.

Our proof-of-concept begins with the idea that NASA may be missing just two ingredients to fully exploit our videoconferencing infrastructure: a "bridge" for the variety of devices and facilities available to NASA personnel and case-specific instructions that enable a broad crosssection of NASA personnel to easily set up videoconferences.

Our proposed multi-phase proof-of-concept/prototype will provide the analysis that would support a way forward for greater utilization of videoconferencing by NASA programs and projects.

The initial phase will provide an analysis of the variety of conferencing capabilities currently available and under evaluation. The resultant white paper would provide functional architecture inputs that facilitate the NASA "as-is" architecture and assist in the "to-be" architecture for conferencing and collaboration. Integral to this initial phase would be evaluation of "integrators", including the variety of software or hardware based multi-point conferencing units (MCU's) available, and how they match up to the requirements and use cases that are representative of NASA videoconferencing needs. Supporting the analysis may be a model or mockup of a v-concierge, the future online wizard for identifying the type of videoconferencing the user requires, recommending the instructions/best practice for planning and setting up the videoconference.

# VPN Authentication and Automated Policy Enforcement

*Project Lead: Richard Pearson*  
*Project Sponsor: Thomas Miglin*  
*Base Center(s): HQ*

Every center has a VPN solution in place leading to differing architectures and additional costs. In an effort to consolidate and reduce the dependency on VPN tokens, innovative ways to perform authentication is desired.

Our project proposes to unify and consolidate VPN authentication and policy enforcement throughout the Agency within the LaunchPad framework. Existing VPN services are provided individually at each of the field Centers, within their own framework. Centralized authentication is the first step toward a consolidated Agency VPN solution to include remote workstations and mobile devices.

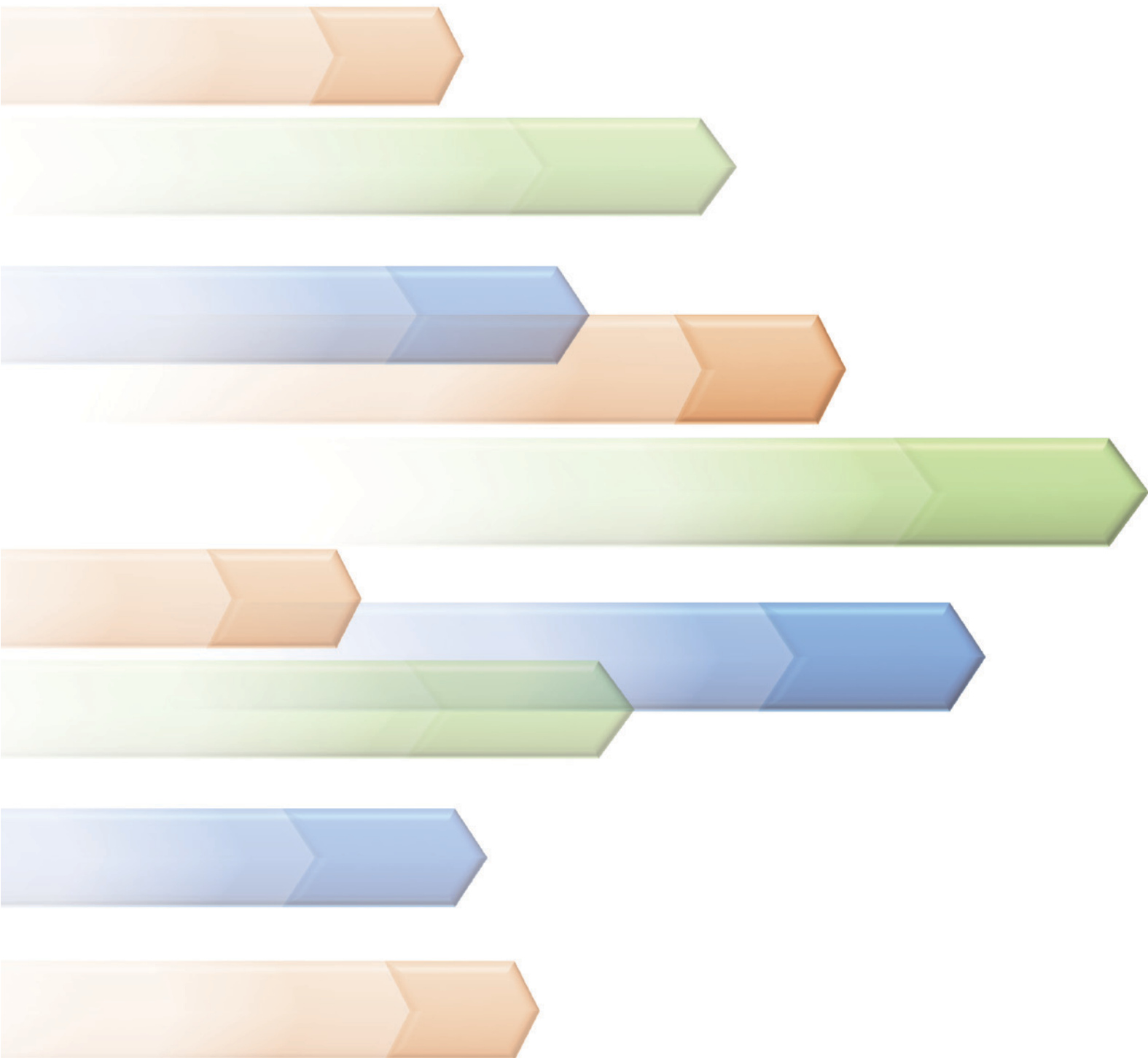
Enabling a centralized and unified authentication/authorization solution for VPN devices allows the Agency to take additional steps toward a highly redundant and available VPN solution. Integration between the VPN devices and the LaunchPad authentication and authorization database is critical to any future progress. Our project will provide the necessary development to enable that communication, and provide a white paper and a demonstrable prototype of the solution.

# Wolfram Alpha Search Overlay Integration

*Project Lead: Allan Stilwell*  
*Project Sponsor: James McClellan*  
*Base Center(s): JSC*

The success of search technology is currently determined by the content that is crawled, which can lead to mixed results. Often, the content does not contain comprehensive details on any specific knowledge area. In short, search is optimized for searching documents. Wolfram Alpha adds the capability to analyze comprehensive knowledge sets and produces an intelligent answer. There is potential that, by combining these two technologies, users will be able to satisfy both needs within one interface.

Our project team will assess the technical capabilities of the Wolfram Alpha API by researching the documentation and producing a working proof-of-concept that will integrate the Wolfram Alpha results with JSC search results. The team will evaluate and customize the look and feel of the product to best gauge the value of the implementation. Once complete, the team will demonstrate the application for IT Labs and will make any changes that are requested. Our team will also recommend whether to move forward with a paid implementation, and potentially, a dedicated appliance.



# IT Labs: The Path to Future Innovation

With so much success experienced by the program, what is next on the horizon one might ask? Well, **plenty** is the answer!

IT Labs is forever in search of new and innovative ways of evolving as a program and helping NASA in reaching its strategic goals. As such, it is constantly improving elements of the program and searching for efficient ways to acquire additional funding to garner great ideas.

## Process

With each iteration and fiscal year, IT Labs reviews the steps it took leading up to, conducting and completing its project calls. Lessons learned are compiled and reviewed to refine the process the program utilizes. Looking forward, the process is already becoming more succinct while still adhering to the objectives the program strives to reach.

## Website

The program tries to stay light on paperwork, but still thrives on effective communication. With this in mind, currently in the works are improvements to the website to make communication more effective.

For projects and their leads, there will be a project dashboard; this dashboard will track elements such as the project title, project lead, sponsor, schedule and updates. Also, templates for status updates will be available with all information required to streamline that effort.

As is the unfortunate case, not all projects submitted to IT Labs can be funded, despite their possible value to the Agency. In light of their possible value though, the website will include a new page called *Sponsorship Opportunities* for those projects that showed promise, but were not fortunate enough to be funded. On this page, potential sponsors will be able to view each project that was not funded and be presented with the opportunity to provide funding should they be interested.

## Federating Innovation—Partnerships


IT Labs is not the only play in NASA's playbook; other programs at other Centers within the Agency are also looking for ways to help NASA reach its goals, especially in the IT community. The program not only wants to bring awareness to these other programs (e.g., [innovate.nasa.gov](http://innovate.nasa.gov) @ JPL, Idea Tank @ MSFC, etc.), but also partner with them in the hopes that synergy will present itself and produce even more effective, innovative ways to bring NASA to the end zone.

In efforts of openness and transparency, the program wants the entire Agency to be aware of these partnerships in hope that more programs will be inspired to partner as well. Tentatively titled *Partners in Innovation*, this new page on our website will inform Agency members of IT Labs' continuing collaborative efforts.

In closing, IT Labs strives to stay on the path to future innovation. While on this path, the program will take the following steps: the continuation of our objectives and the development of innovative partnerships and relationships; improving the website for more effective communication between the program and its projects; further refining of the process from our previous experience with project calls; working on integrating innovations into operational capabilities and valuable Enterprise deployments; and finally, leveraging the knowledge of each project and input from users across the Agency.







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